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RMRS Rocky Mountain Remediation Services, L.L.C.
. . . protecting the environment
Rocky Flats Environmental Technology Site
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0000067368

August 28, 1997

CORRES. CONTROL
LTR. NO.
DOE Order #
Letter #TWO-043-97

DIST.	LTR	ENC
CARMEAN, H.		
CRAWFORD, A.C.		
FINDLEY, M.E.		
GUINN, L.A.		
HUGHES, F.	X	
OVERLID, T.W.		
PRICE, K.		
TYSON, A.M.		
WHEELER, M.	X	
Fraizer, M. S.		
Gorwinski, G.R.		
Morse, J. L.		
Reed, A.B.		
Reinhart, W.D.		
Sandoval, S.		
Swanson, D.R.	X	X
RMRS CORRES. CONTROL	X	X
FILE	X	

CLASSIFICATION:
UCNI
UNCLASSIFIED X
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AUTHORIZED CLASSIFIER SIGNATURE: N/A
Date:

IN REPLY TO RF CC NO.:

ACTION ITEM STATUS:
☐ PARTIAL/OPEN
☐ CLOSED

LTR APPROVALS:

ORIG. & TYPIST INITIALS: DRS/mam

1/77

RF-46469(Rev.9/96)

S. K. Crowe
Division Manager, Engineering & Integration
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Building T130C
Rocky Flats Environmental Technology Site

1997 ANNUAL UPDATE AND PROPOSED TSR PAGE CHANGES TO BUILDING 906 FINAL SAFETY ANALYSIS REPORT (FSAR) - TWO-043-97

Ref. Building 906 FSAR, Revision 3, Rocky Flats Environmental Technology Site, April 1997

This correspondence transmits to Kaiser-Hill copies of the 1997 Annual Update to the Building 906 FSAR and proposed Technical Safety Requirement (TSR) Page Changes to the Building 906 FSAR for transmittal to the Department of Energy, Rocky Flats Field Office (DOE, RFFO).

The 1997 Annual Update to the Building 906 FSAR (Attachment 1) incorporates information previously evaluated in Unreviewed Safety Question Determinations (USQDs) as well as editorial clarifications and corrections. Therefore, DOE, RFFO approval is not required prior to incorporation of these changes into the FSAR, and these changes are submitted for information only as Revision 4 to the Building 906 FSAR. These changes are effective upon your approval.

The proposed TSR Page Changes to the Building 906 FSAR (Attachment 2) require RFFO approval prior to incorporation into the FSAR. These changes are either editorial in nature, or reflect recent changes in the independent safety review process. The first proposed change affects the administrative control TSR, Section 4.4.4, *Independent Safety Reviews, Audits, and Self-Evaluation Program* and reflects changes in the Independent Safety Review structure at the Rocky Flats Environmental Technology Site (RFETS). The Safety Review Board is no longer in existence and the Building Operations Review Committee (ORC) is now referred to as the *RMRS ORC*. The second proposed change is an editorial clarification regarding the administrative control TSRs in Section 4.2, *Derivation of TSRs*. The third proposed change is an editorial correction to reflect the name change of the Rocky Flats Plant to the Rocky Flats Environmental Technology Site.

AUG 1997
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ADMIN RECORD
IA-A-000802

Please review and transmit the attached RMRS documents to DOE, RFFO for approval. If you have questions or comments, please contact Don Swanson at extension 7009 or Michael Natzke at extension 6080.

T. W. Overlid
Vice President, Program Compliance
Rocky Mountain Remediation Services, L.L.C.

DRS:man

Attachments:
As Stated (2)

cc:
E2 Consulting Engineers of Colorado
M. A. Natzke w/o attachments

MacTec
S. Walker-Lembke w/o attachments

2

ATTACHMENT 1

1997 ANNUAL UPDATE TO BUILDING 906 FSAR

Rocky Flats Environmental Technology Site

3

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APPENDIX 1: 1997 ANNUAL UPDATE PAGE CHANGES

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1.0 INTRODUCTION

The 1997 Annual Update to the Building 906 Final Safety Analysis Report (FSAR) incorporates information previously evaluated in USQDs and editorial clarifications and corrections. Therefore, DOE approval is not required prior to incorporation of these changes into the FSAR. The changes are included as Revision 4 to the FSAR.

2.0 REFERENCE DOCUMENTS

a) Building 906 Final Safety Analysis Report, Rev. 3, April 1997.

b) DOE Order 5480.23, Nuclear Safety Analysis Reports, April 30, 1992.

c) USQD-906-95.0887-ARS, Triwall and Crate Substitution, Building 906, as requested in JWS-054-95, Rev. 0, June 15, 1995.

d) USQD-RFP-97.0510-TLF, Americium in Quantities Greater than Analyzed in the FSARs, Rev. 0, May 29, 1997.

e) USQD-RFP-97.0943-RAB, 4-U69-NDT-00002, Field Radiography Operation Using a Radiographic Source, Rev. 1 for RMRS facilities.

f) NSEPD:JCS:12659, Letter from P.M. McEahern to D.P. Ferguson, Rocky Flats Field Office Review of Annual Update to Building 906 Final Safety Report, October 5, 1995.

3.0 DESCRIPTION OF CHANGES

The Revision 4 changes to the Building 906 FSAR are described below.

Annual Update Change 1
Add container types and correct dimensions of "I" and "V" crates.

Page 2-1, Section 2.2. *Change the first sentence and add a sentence in the second paragraph as follows:* The types of waste containers used for storage are 55-gallon drums, half-size wood crates (2x4x7 feet), full-size wood crates (4x4x7 feet), metal "I" crates (62x62x49.75 inches), metal "V" crates (88x47x39.75 inches), and triwall boxes (39.5x39.5x22 inches). Triwall boxes are overpacked in the metal boxes.

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Annual Update Change 2
Add activity of performing triwall overpack inspections.

Page 2-3, Section 2.4. *Add sentence to first paragraph and move Section 2.6 to next page.* Triwall overpack containers are opened and inspected for water to verify their compliance with the requirement that no liquids are allowed in the facility. The overpack lids are not a radiological containment boundary.

Page 5-3, Section 5.3. *Change sentence in first paragraph.* Aside from container overpacks or container physical protection devices, waste containers shall not be opened.

Annual Update Change 3
Add activity of performing field radiography with a sealed radiological source.

Page 2-3, Section 2.4. *Add sentence.* Field radiography may be conducted in Building 906 to determine the contents of waste containers.

Page 3-6, Section 3.3.2. *Add paragraph and continue text onto new page 3-6a.* The sealed radiological sources used in field radiography are certified by the manufacturer to meet the testing requirements of 49 CFR Parts 100 - 199. The sources will present a standard industrial hazard to immediate workers from ionizing radiation, but any exposure will be controlled through the implementation of the As Low as Reasonably Achievable (ALARA) principle of radiation protection. These sources are not considered part of the MAR or part of the facility radioactive inventory for purposes of the hazard analysis.

Annual Update Change 4
Address the high americium issue raised in USQD-RFP-97.0510-TLF, Americium in Quantities Greater than Analyzed in the FSARs.

Page 3-22, Section 3.5. *Add paragraph:* It is not expected that americium is present in quantities greater than previously evaluated for Building 906. However, for low-level waste, the difference in dose consequence between aged WG Pu and pure americium would not be sufficient enough to change the conclusions of the accident analyses regarding the significance of potential consequences for the MOI or the collocated worker (USQD, 1997).

Page 3-26. *Add reference:* USQD, 1997; USQD-RFP-97.0510-TLF, Americium in Quantities Greater than Analyzed in the FSARs, Rev. 0, May 29, 1997.

Annual Update Change 5
Delete erroneous sentence.

Page 3-5, Section 3.3.2. *Delete the third sentence of the first paragraph.*

Annual Update Change 6
Editorial clarification; delete dimensions.

Page 3-5, Section 3.3.2. *Delete all of the container information in the first paragraph.*

Annual Update Change 7
Editorial change. Replace "Rocky Flats Plant" or "RFP" with "Rocky Flats Environmental Technology Site" or "RFETS" as appropriate.

Pages iv, 1-1, 2-1, 2-3, 3-1, 3-3, 3-4, 3-15, 3-16, 3-21, 5-1 through 5-8, B-20, and C-2.

Annual Update Change 8
Editorial change. Update references.

Page 1-1, Section 1.0. *Replace "draft DOE-STD-3009-93 (DOE, 1993)" with "DOE-STD-3009-94 (DOE, 1994)" in the first sentence.*

Page 1-2, Section 1.4. *Replace "DOE, 1993" with "DOE, 1994" and "DOE-STD-3009-93" with "DOE-STD-3009-94" and "Draft, 1993" with "July, 1994."*

Page 3-1, Section 3.1. *Replace "Draft DOE-STD-3009-YR" with "DOE-STD-3009-94" in the first sentence of the second paragraph.*

Page 3-2, Section 3.2, Natural Phenomena Hazards Design and Evaluation Criteria for DOE Facilities. *Replace "1020-92 (Draft)" with "1020-94" and "February 28, 1993" with "April 1994."*

Page 3-2, Section 3.2, Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports. *Replace "3009-93 (Draft)" with "3009-94" and "November 18, 1993" with "July 1994."*

Page 3-5, Section 3.3.1.2. *Replace "RCRA Permit Part B Operating Requirements (DOE, 1996)" with "RFETS RCRA Permit (DOE, 1997)" in the first sentence of the second paragraph.*

Page 3-11, Section 3.3.4. *Replace two occurrences of "Rocky Flats Plant RCRA Permit and Compliance Document (DOE, 1996)" with "RFETS RCRA Permit (DOE, 1997)"- one in the second paragraph and one in the fourth paragraph.*

Page 3-19, Section 3.4.1.2. *Replace "Draft DOE-STD-3009-YR" with "DOE-STD-3009-94" in the fourth paragraph.*

Page 3-20, Section 3.4.2.1. *Replace "draft DOE-STD-1020-92 (DOE, 1993)" with "DOE-STD-1020-1994 (DOE, 1994c)."*

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Page 3-23, Section 3.6, DOE 1993. Replace "DOE 1993" with "DOE, 1994c" and "1020-92 (Draft)" with "1020-94" and "February 28, 1993" with "April 1994."

Page 3-23, Section 3.6, DOE 1994a. Replace "DOE-STD-3009-YR (Draft)" with "DOE-STD-3009-94" and "April 1994" with "July 1994."

Annual Update Change 9
Editorial change; change verb tense.

Page iv. First paragraph, first sentence. Change "will be" to "is."

Page iv. First paragraph, third sentence. Change "will be" to "are."

Annual Update Change 10
Editorial change. Delete description of implementation schedule.

Page 5-7, Section 5.10. Delete third sentence.

4.0 JUSTIFICATION OF CHANGES

The justification for changes to the Building 906 FSAR are described below.

Annual Update Change 1
Add container types and correct dimensions of "I" and "V" crates.

Justification:
The introduction of triwall containers was previously evaluated in USQD-906-95.0887-ARS and formally approved by DOE in NSEPD:JCS:12659. This change was reviewed for revision 1 to the FSAR; however, the appropriate changes did not get into the FSAR text. The dimensions for the "I" and "V" crates were previously listed incorrectly.

Annual Update Change 2
Add activity of performing triwall overpack inspections.

Justification:
The verification that the packages conform to Building 906 acceptance criteria (i.e., no liquids) cannot be completely determined by external inspections or weight comparisons. This activity was evaluated in USQD-906-97.0600-MDT and does not constitute a USQ.

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Annual Update Change 3
Add activity of performing field radiography with a sealed radiological source.

Justification:
This activity may be necessary for waste characterization in Building 906 and poses only a standard industrial hazard. This issue was evaluated in USQD-RFP-97.0943-RAB and does not constitute a USQ.

Annual Update Change 4
Address the high americium issue raised in USQD-RFP-97.0510-TLF, Americium in Quantities Greater than Analyzed in the FSARs.

Justification:
The high americium issue for Building 906 was evaluated in *USQD-RFP-97.0510-TLF* and does not constitute a USQ.

Annual Update Change 5
Editorial clarification.

Justification:
The metal "V" crates are not used for overpack of full-size crates.

Annual Update Change 6
Editorial clarification; delete dimensions.

Justification:
The container information is already provided in Chapter 2, and the specific information regarding use of the "I" crate is no longer relevant since the inventory control TSR is in place.

Annual Update Change 7
Editorial change. Replace "Rocky Flats Plant" or "RFP" with "Rocky Flats Environmental Technology Site" or "RFETS" as appropriate.

Justification:
Reflect name change of Site.

Annual Update Change 8
Editorial change. Update references.

Justification:
References were not current.

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Annual Update Change 9
Editorial change. Change verb tense.

Justification:
Verb tense was not correct.

Annual Update Change 10
Editorial change. Delete description of implementation schedule.

Justification:
Information is no longer applicable.

APPENDIX 1

1997 ANNUAL UPDATE PAGE CHANGES

Final Safety Analysis Report
Building 906
Centralized Waste Storage Facility

Revision 4

Rocky Flats Environmental Technology Site
Golden, Colorado

Hazard Category 3
Nuclear Facility

August, 1997

12

Prepared by _____ 8/25/97
M.A. Natzke, E2 Date

Reviewed by _____ 8/25/97
M.L. Crawford, Tenera Date

Approved by _____ 8/26/97
D. R. Swanson, RMRS Date
Authorization Basis

Approved by _____ 8-26-97
P. Sauer, RMRS Date
Responsible Manager

Approved by _____ 8/27/97
S. Crowe, Kaiser-Hill Date
Closure Projects

EXECUTIVE SUMMARY

Building 906, the Centralized Waste Storage Facility, is used exclusively for storage of solid (no free liquids) low level waste, low level mixed waste, and hazardous chemical waste forms that have been or will be generated during both normal site operations and future decontamination and decommissioning activities. Building 906 is a metal structure and is located in the southeast section of the Rocky Flats Environmental Technology Site (RFETS). These wastes are stored in drums on pallets, in wooden crates, or in "I" or "V" type metal crates. Waste is to be stored in Building 906 until offsite shipment can be arranged. It is probable that the useful life of Building 906 will extend until such time as the RFETS Environmental Restoration/Decontamination and Decommissioning mission is completed.

This Safety Analysis Report (SAR) was prepared in advance of facility construction and is based on the best available design and building use information. Building 906 became operational in late 1994.

Building 906 has been categorized as a Hazard Category 3 Nuclear Facility based on its anticipated inventory of radionuclides and hazardous chemicals. The accident analysis focuses on generic bounding events rather than specific scenarios. In general, the types of accidents considered were spills and fires. Other accident types were either screened out or were not applicable (*e.g.* criticality). Many different types of events can lead to either spills or fires. In the case of Building 906, even the effects of the worst case accident (a spill of hazardous materials due to an earthquake) does not require taking credit for the various mitigative measures (*e.g.* fire suppression or various administrative programs) present in the building. For the worst case accident involving Building 906, the accident analysis shows that the consequences are within the established limits for a Hazard Category 3 facility.

The accident analysis does require that a limit be placed on the total inventory of radionuclides that can be stored in the building. This limit is implemented in the form of a Technical Safety Requirement (TSR) that will be in effect at all times.

Chapter One provides an introductory discussion about the facility. A description of the facility can be found in Chapter Two. The hazard categorization and accident analyses are described in Chapter Three. The Technical Safety Requirements are located in Chapter Four. A discussion of the key safety management programs that are in effect for RFETS is located in Chapter Five.

CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

This Safety Analysis Report was prepared in accordance with DOE Orders 5480.23 (DOE, 1992b) and its implementing Standards DOE-STD-1027-92 (DOE, 1992a) and DOE-STD-3009-94 (DOE, 1994). The Centralized Waste Storage Facility, Building 906, is used for storage of low-level waste, low-level mixed waste, and hazardous chemical waste. These wastes are a combination of wastes that have been generated by past operations and wastes that will be generated in the future during normal operation and as part of various decontamination and decommissioning activities. The wastes stored in Building 906 do not include free liquids. The type and quantity of wastes stored in Building 906 allow it to be categorized as a Hazard Category 3 Nuclear Facility.

1.1 SITING

The Rocky Flats Environmental Technology Site (RFETS) is located in northern Jefferson County, Colorado, about 16 miles northwest of downtown Denver. The RFETS and surrounding buffer zone encompasses about 6,550 acres of federally owned land. The major facilities are located within a 384 acre area enclosed by a security fence. The buffer zone is used for wildlife habitat; the general public is generally excluded from access. Access to RFETS is controlled by a security force and gates located at the east and west entrances to the plantsite. Building 906 is located south of Central Avenue, adjacent to the southwest corner of the existing 904 Pad as shown in Figure 2-1.

1.2 NATURAL PHENOMENON THREATS

The threats to Building 906 from natural phenomenon include those that challenge the facility structurally, such as tornados, high winds, and seismic events, and those that threaten the facility in other manners, such as flooding. Because of the location of the facility and the local geography (high elevation relative to surroundings), major flooding is not a credible concern. Localized flooding will be channeled away from the facility as discussed in Chapter 2. Consequences of credible natural phenomenon are addressed in Chapter 3.

1.3 MAN-MADE THREATS

The man-made threats to which Building 906 could be exposed include several different types of events that could result in spills from containers (*e.g.* handling accidents), events that could result in fires (*e.g.* electric faults, fuel spills), or both fires and spills (*e.g.* airplane crash). Other threats to this building could come from nearby facilities. The threats posed from each of these events are enveloped by the accident analysis performed in Chapter 3.

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1.4 REFERENCES

DOE, 1992a — *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, **DOE-STD-1027-92**, U. S. Department of Energy, Washington, D.C., December, 1992.

DOE, 1992b — *Nuclear Safety Analysis Reports*, **DOE Order 5480.23**, U. S. Department of Energy, Washington, D.C., April 30, 1992.

DOE, 1994 — *Preparation Guide for U. S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*, **DOE-STD-3009-94**, U. S. Department of Energy, Washington, D.C., July 1994.

CHAPTER 2

FACILITY DESCRIPTION

2.1 INTRODUCTION

This chapter provides facility and process descriptions for the Centralized Waste Storage Facility (CWSF), Building 906. This chapter satisfies the requirements of DOE 5480.23, Topic 4. Because the CWSF is a Hazard Category 3 facility, this chapter only describes the facility in sufficient detail to allow the reader to understand the accident analyses discussed in Chapter 3. **Also, because of the relatively low hazard of the facility, it has no safety class systems that are depended upon to mitigate the consequences of an accident. The structural, operational, and system descriptions provided in this chapter are for descriptive purposes only.**

2.2 FACILITY OVERVIEW

Building 906 is a single story, 25,000 square foot steel frame, metal clad structure used to store packaged waste containers prior to off-site shipment. The facility is located at the east end of RFETS, southwest of the existing 904 Pad as indicated in Figure 2-1. The facility is used to store solid low-level waste (LLW), Low Level Mixed Waste (LLMW), and hazardous chemical waste (HAZ). These wastes are a combination of materials that have been generated by past operations at RFETS and waste materials that will be generated in the future during normal operations and as part of the Decontamination and Decommissioning (D&D) activities at RFETS. No free liquids will be stored in the facility Figure 2-2 shows views of the building exterior and Figures 2-3 and 2-4 show building floor plans.

The types of waste containers used for storage are 55-gallon drums, half-size wood crates (2x4x7 feet), full-size wood crates (4x4x7 feet), metal "I" crates (62x62x49.75 inches), metal "V" crates (88x47x39.75 inches), and triwall boxes (39.5x39.5x22 inches). Triwall boxes are overpacked in the metal boxes. Due to interior clearances, drums can be stacked four high and the crates can be stacked up to 16 feet 6 inches high. There will be at least a 26 inch aisle between palleted rows of drums and between rows of crates. Figures 2-5 and 2-6 show typical Building 906 drum and crate layouts.

Material handling equipment to be used in this facility will consist of common industrial items including electric forklifts and barrel huggers. A recharging station will be provided for the forklifts.

2.3 FACILITY STRUCTURE

Building 906 is a single story, steel-frame, insulated steel-sided structure with reinforced concrete footings, foundations, and epoxy sealed floors. The frame of the building is constructed of rigid steel frames (transverse) and braced steel frames (longitudinal). The roof and walls are constructed of interlocking steel panels that provide shelter from normal atmospheric phenomenon. The building has electrically operated rollup doors and a loading platform located outside the structure. The seismic and wind design is in accordance with UCRL-15910 (Kennedy, *et al.* 1990) for a low hazard facility. More detailed facility design information can be found in the Design-Build Criteria document for Building 906 (EG&G, 1993).

2.4 PROCESS DESCRIPTION

Building 906 will receive LLW, LLMW, and HAZ in drums and crates from on-site generators at RFETS. Containers of waste are inspected for dents and other damage. Waste container identification is verified. Containers that do not meet specific criteria concerning attributes such as bulges, dents, loose bolts, holes, loose packaging, incomplete paperwork, excess weight, inconsistent identification numbers, etc., are rejected and returned to the generator. Triwall overpack containers are opened and inspected for water to verify their compliance with the requirement that no liquids are allowed in the facility. The overpack lids are not a radiological containment boundary. Field radiography may be conducted in Building 906 to determine the contents of waste containers.

Prior to shipment to Building 906, containers are weighed, proper labeling is applied, and any needed minor painting (touch up painting only) of drums is performed to ensure an acceptable condition for storage. Painting supplies are not stored in Building 906. When a container is ready to be stored, it is moved to a specific area of the facility depending upon its contents using an electric forklift. Crates can be stacked up to three high with layers separated by plywood or pallets. Drums are stored on pallets, and may be stacked up to four high with layers separated by plywood or pallets. The top layer of drums are banded together in groups of four.

2.5 SAFETY SUPPORT SYSTEMS

The building is provided with an ordinary hazard, Group II, wet pipe sprinkler system, with flow detection, designed in accordance with appropriate National Fire Protection Association (NFPA) codes (NFPA 13) and connected to the RFETS fire water supply. The building has manual fire alarm pull stations with alarm bells located at opposite ends of the building. Fire detectors are also provided in the supply ducts to the building from the heating units. The flow detection, duct fire detection, and manual fire alarm pull stations are monitored at the local fire alarm control panel. The local fire alarm control panel annunciates at the Central Alarm Station and the Fire Dispatch Center initiating an emergency response by the onsite RFETS fire department in the event that a pull station or water flow alarm is received by the fire alarm control panel.

2.6 UTILITY DISTRIBUTION SYSTEM

Single phase 120 volt power is provided for miscellaneous loads (lighting, receptacles, communications, and alarms). Lighting is provided by high pressure sodium lamps. Three phase 208 volt power is provided at the fork lift charging station. Telephone service is provided to the building.

Natural gas is supplied to externally mounted heaters. The natural gas piping does not enter the building. The ventilation system operates full time and provides a minimum of six air changes per hour using 100% outside air. The power to the make up air units is three phase 208 volt power.

Water drainage from the 906 Pad area has been modified such that neither the 906 Pad nor other site buildings will be affected by the increased runoff caused by the increase in impermeable area created by construction of the facility. The 906 site is graded such that drainage runs away from the building and toward existing ditches and culverts. A retention area is provided just upstream of the culvert crossing Central Avenue to allow for the increased runoff caused by the facility.

CHAPTER 3

HAZARD AND ACCIDENT ANALYSIS

3.1 INTRODUCTION

The objective of this chapter is to identify and assess the hazardous materials stored within Building 906, the Centralized Waste Storage Facility (CWSF) at the Rocky Flats Environmental Technology Site (RFETS), and to evaluate the consequences of potential accidents that could release these hazardous materials. Results of the accident analysis are compared to applicable evaluation guidelines to determine the adequacy of facility safety provisions. This chapter covers the topics of hazard identification, hazard classification, and accident analysis. In this chapter the terms CWSF and Building 906 are used interchangeably.

The format of this chapter follows that suggested in DOE-STD-3009-94 (DOE, 1994a), with the exception that the recommended Hazard Identification and Classification section has been split into separate sections on Hazard Identification, Nuclear Hazard Classification, and Chemical Hazard Classification. In keeping with the graded approach, the minimum content required by this standard for Chapter 3 is used because the CWSF is a Hazard Category 3 facility, as will be shown below.

Facilities adjacent to the CWSF are Tent 7, which contains sanitary waste, and the tents on the 904 Pad, which are used for storing wastes similar to those in the CWSF. Activities in either facility are not expected to cause a release of material from the adjacent facility. There are propane tanks located to the south of the 904 Pads which could be an initiator for a release from Building 906. However, the consequences from such a scenario would be bounded by the scenarios analyzed in this document.

3.2 REQUIREMENTS

The design codes, standards, regulations, and DOE Orders that are required for establishing the safety basis of the CWSF are listed below. These documents (or portions thereof) cover only those requirements pertinent to safety analysis.

Safety Analysis and Review System, DOE Order **5481.1B**, U.S. Department of Energy, Washington, DC, September 23, 1986, revised May 19, 1987.

This document establishes the requirement for safety analysis and review at DOE facilities. It has been superseded by DOE Order 5480.23 (listed below) for nuclear facilites but is still the driver for chemical analysis.

General Design Criteria, DOE Order **6430.1A**, U.S. Department of Energy, Washington, DC, April 6, 1989.

The portion of this order relevant to this SAR defines the exposure time to use in calculations of doses.

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Technical Safety Requirements, DOE Order **5480.22**, U.S. Department of Energy, Washington, DC, February 25, 1992.

This order requires the preparation of Technical Safety Requirements (TSRs).

Nuclear Safety Analysis Reports, DOE Order **5480.23**, U.S. Department of Energy, Washington, DC, April 30, 1992.

This order requires the preparation of Safety Analysis Reports (SARs) for nuclear facilities.

Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports, DOE Standard **1027-92**, U.S. Department of Energy, Washington, DC, December 1992.

The gram limits for plutonium for the hazard categories are given in this standard.

Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities, DOE Standard **1020-94**, U.S. Department of Energy, Washington, DC, April 1994.

The CWSF is built to the seismic design requirements of this standard.

Guidance for Preparation of DOE 5480.22 (TSR) and DOE 5480.23 (SAR) Implementation Plans, DOE Standard **3011-94**, U.S. Department of Energy, Washington, DC, November 1994.

This standard provides guidance on the implementation of DOE Orders 5480.22 and 5480.23.

Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports, DOE Standard **3009-94**, U.S. Department of Energy, Washington, DC, July 1994.

This standard provides guidance on the implementation of DOE Order 5480.23.

A. H. Paoule, *Revision of the Building 664 Safety Analysis Report in Response to Technical Review Group Comments*, letter **WPD:JJR:02844** to H. P. Mann, May 5, 1993.

This letter provides guidance on chemical hazard classification.

T. A. Vaeth, *Review of the Interim Draft Safety Analysis Report, dated July 15, 1992*, letter **WPD:MR:8866** to J. O. Zane, August 24, 1992.

This letter provides guidance on chemical hazard classification.

3.3 HAZARD ANALYSIS

The determination of the degree of hazard that may be presented by the CWSF involves the evaluation of both the radiological hazard and the chemical hazard. This section identifies the radiological and chemical hazards present in Building 906, gives an evaluation of the hazard classification, and presents conservative evaluations of the two accident types (spills and fires) that could affect the facility.

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3.3.1 Methodology

This section identifies the methods used to identify hazardous materials and energy sources in terms of quantity, form, and location, and presents the guidance followed in evaluating the degree of hazard.

3.3.1.1 Hazard Identification

The CWSF is used to store low-level waste (LLW), low-level mixed waste (LLMW), and hazardous chemical waste (HAZ). These wastes are a combination of materials that have been generated by past operations at RFETS and waste materials that will be generated in the future during normal operations and as part of the Decontamination and Decommissioning (D&D) activities at RFETS. These wastes are grouped into waste forms that are codified with an Item Description Code (IDC) in the case of LLW and LLMW, or a Waste Form Code (WFC) or verbal descriptor in the case of HAZ. IDCs, WFCs, and verbal descriptors are shown in Appendix B. Some of the waste containers destined for the CWSF are the LLW, LLMW, and HAZ containers in RCRA Units 1, 13, and 15A, except for liquid wastes and some special containers, which are excluded.

For the existing waste containers, the general nature of the waste is known from knowledge of the processes that generated the waste. However, detailed chemical assays were not done for every container during the period of generation of the wastes. Because of the lack of a detailed chemical assay, a statistical approach has been used to estimate the upper limits on the quantities of chemicals in the various waste forms. The upper limits on the amount of Weapons Grade Plutonium (WG Pu) that may be in the containers can be estimated from a knowledge of where the waste originated, a statistical analysis of waste which has been assayed and from the definitions of LLW and LLMW. For transuranic wastes, such as WG Pu, the 10 CFR 61 (1993) definition of LLW/LLMW is that alpha emitters with half-lives greater than five years (for WG Pu, these are all of the isotopes except ^{241}Pu) must have an activity less than 100 nCi/(gram of waste) and the ^{241}Pu (a beta emitter) activity must be less than 3,500 nCi/(gram of waste). When both alpha and beta emitters are present, the "sum of the fractions" rule must be applied. This rule states that the sum of the ratios of the alpha activity to 100 nCi/(g of waste) and beta activity to 3,500 nCi/(g of waste) must be less than one. [For Weapons Grade Plutonium (WG Pu) at RFETS, the alpha activity is 0.076 Ci/(g of WG Pu) and the beta activity (from ^{241}Pu) is 0.336 Ci/(g of WG Pu) (RFRAG, 1993).] However, to be conservative, the 100 nCi/g value will be used in the following analysis, along with measured container weights or conservative estimates of container weights.

The energy sources that could lead to accidental releases of hazardous materials are identified from the preliminary drawings and designs of the building (*e.g.*, the electrical layout described in Chapter 2) and from a general knowledge of the energy sources on and near RFETS, such as aircraft traffic.

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3.3.1.2 Hazard Evaluation

The radiological comparison criteria followed in this Safety Analysis Report are taken from DOE Standards 1027-92 (DOE, 1992b) and 3011-94 (DOE, 1994b). Chemical hazards are evaluated qualitatively.

For radiological hazards, DOE-STD-1027-92 allows the use of inventory thresholds for initial screening to determine if the facility is Hazard Category 3. For facilities that exceed this category in the initial screening evaluation, a more in-depth analysis, using realistic meteorology and release fractions appropriate to the releases postulated is allowed by DOE-STD-1027-92. Meteorological conditions used in this standard for dispersion modeling for hazard evaluation purposes is an atmospheric stability class of D and a wind speed of 4.5 m/s. The Off-Site and On-site doses used are those identified in DOE-STD-3011-94. The corresponding frequency binning is also used to determine the overall risk for the facility.

The term *Local* refers to the building interior and the service areas immediately outside the building. *On Site* refers to the area within the plant boundaries but beyond the local area; for hazard analysis purposes the on-site (or collocated) worker is taken to be 100 m downwind of the accident. *Off Site* refers to any place beyond the plant boundaries and therefore deals with the public. The point closest to Building 906 at which a member of the public could stand would be the closest point on the site boundary. This is normally taken to be 1,900 meters for RFETS. (For Building 906, the closest point on the plant boundary is 2,087 meters directly to the south of the building. The use of 1,900 meters, which allows use of established evaluations of public doses at the plant boundary, would be slightly more conservative than using the actual value.)

Hazardous chemicals in Building 906 are not in bulk form or product materials. Hazardous chemicals may be present in waste containers. These hazardous materials are allowed in the facility under the waste management program. The qualitative consequence binning for chemical hazards is summarized in Table 3-1. A brief discussion of the basis of this guidance is given in Appendix A.

Table 3-1. Chemical Accident Consequence Levels

CONSEQUENCE	PUBLIC EXPOSURE @ 1900 meters	WORKER EXPOSURE @ 100 meters
HIGH	> ERPG-2	> ERPG-3 or prompt death
MODERATE	NA	serious injury
LOW	< HIGH	< MODERATE

In Table 3-1, the term ERPG refers to the *Emergency Response Planning Guidelines* published by the American Industrial Hygiene Association (AIHA). These guidelines are a set of three numbers (ERPG-1, ERPG-2, and ERPG-3) for each chemical that quantify the air concentrations that correspond to low, moderate, and severe health effects in humans. Not all chemicals have been

assigned ERPG values. The hierarchy for use of alternative standards where no ERPG value exists is discussed in Appendix A, which also gives the ERPG-2 and ERPG-3 values for the chemicals which may be encountered in the wastes in the CWSF. For instances when multiple IDCs and therefore multiple ERPG values are involved in the scenario, the sum of the ERPG fractions (ratio of concentration to ERPG) is compared to one to determine if the ERPG threshold of concern could be exceeded.

Since Building 906 is a permitted RCRA facility, waste forms and containers must be in compliance with the *RFETS RCRA Permit* (DOE, 1997). Evaluation of chemical hazards in Building 906 assumes material handling, packaging, and operations are in compliance with the RCRA requirements. The receptors of interest for chemical hazards are the same as for radiological hazards.

3.3.2 Hazard Identification

The CWSF is used for storage of Low-Level Waste (LLW), Low-Level Mixed Waste (LLMW), and chemically hazardous materials (HAZ). The term "mixed" refers to a mixture of radiological and chemically hazardous materials. The term "low level" refers to radioactive materials and by definition includes only wastes that have no more than a given level of activity, the level depending upon the nuclide. As discussed earlier, for WG Pu this corresponds to an alpha activity of less than 100 nCi/(g of waste).

The maximum number of containers to be stored in Building 906 is 9,299 55-gallon drums, and 338 crates. If more than 338 crates are stored in Building 906, the excess must be either Pondcrete, Saltcrete, or a combination of the two. To be conservative in the analysis to follow, the CWSF radiological inventory is taken to be present in both drums or crates, whichever results in the highest material releases. The case of the CWSF being filled with only crates of Saltcrete and/or Pondcrete is also addressed below and shown to pose a smaller hazard than the maximum drum and crate inventory.

The Waste and Environmental Management System (WEMS) is a computer-based system on the plant's VAX computers for tracking the waste at RFP; it can be accessed through the plant Local Area Network. The WEMS database lists each container of waste by its IDC or WFC, container identifier, date of generation, Unit Number, and current location. Other data of interest to this report, namely the U, Pu, and Am content and the net weight of each container, are optional data and are often not included in the WEMS database.

Several activities have been performed which provide information applicable to characterization of waste which may be stored in Building 906. Some of these activities were performed to directly support the original version of this FSAR. Appendix B contains the results

of two Building 906 characterization support activities. Appendix C contains tables generated to support development of the Building 664 FSAR (Kaiser-Hill, 1996b).

Appendix B shows a summary of WEMS data for all containers in RCRA Units 13 and 15A as of November 4, 1993. These are representative of material which could be moved to Building 906. Appendix B also contains the identification of the chemical wastes and an upper limit of their amounts, in terms of parts-per-million or percent. This quantification was derived from process knowledge of the waste generators and a statistical analysis of the chemical assays that were available. These two activities showed a lack of specific information regarding weight and hazardous material loading of existing IDCs. This requires conservative assumptions to be used in consequence analysis. For radiological constituents, the appropriate choices to support a conservative, but not unreasonable analysis, are to assume the maximum allowable container weight for all IDCs with the corresponding maximum radiological loading of 100 nCi α/gram of waste. Alternatively, Appendix C contains the composite results of a statistical analysis of WG Pu loading and container weight for all low-level waste on site.

The chemical constituent characterization information in Appendix B was based primarily on various semi-statistical approaches due to a lack of analytical sampling results. The various approaches are discussed in Appendix B. Similarly conservative approaches were used to develop IDC characterization information to support the Building 664 FSAR (Kaiser-Hill, 1996b). These conservative characterization results were the basis for the tables contained in Appendix C. These tables list the number of containers needed to be involved in an accidental release, spill or fire, to exceed consequence thresholds of concern for the public and collocated worker. The large numbers in Appendix C indicate that the likelihood is small for a single IDC exceeding a threshold of interest as there will be a mix of IDCs within Building 906. The large number also indicates that the ERPG fractions which are used to consider synergistic affects will be small. Therefore, the probability of exceeding one when summing ERPG fractions is also small.

The sealed radiological sources used in field radiography are certified by the manufacturer to meet the testing requirements of 49 CFR Parts 100 - 199. The sources will present a standard industrial hazard to immediate workers from ionizing radiation, but any exposure will be controlled through the implementation of the As Low as Reasonably Achievable (ALARA) principle of radiation protection. These sources are not considered part of the MAR or part of the facility radioactive inventory for purposes of the hazard analysis.

3.3.3 Nuclear Hazard Classification

In Section 3.3.1.2, evaluation criteria were set forth for the various hazard categories. As was noted above, DOE-STD-1027-92 allows a preliminary estimate of the nuclear hazard classification of a facility to be made simply by comparing the amount of the radioactive material at the facility with certain thresholds. If the amount of material is less than the lowest threshold, the facility hazard is low enough that a SAR is not required, at least in terms of radioactivity. If the amount falls between the

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lowest and second thresholds, the facility is considered Hazard Category 3; if greater than the second threshold, it is Hazard Category 2. Hazard Category 1 is reserved for Class A reactors or facilities designated by the Program Secretarial Officer (PSO). For the materials to be stored in Building 906, the radioactive materials of concern are uranium (U), plutonium (Pu), and americium (Am). The Hazard Category 2 and Hazard Category 3 thresholds for isotopes of U, Pu, and Am taken from DOE-STD-1027-92 are given in Table 3-2. The lower thresholds that designate a facility as Hazard Category 3 are given in the last two columns (which are equivalent) and those for Hazard Category 2

stored in Building 906. Due to the lack of chemical concentration data for most waste and since chemicals present in solid mixed waste are likely small quantities, a qualitative approach for evaluation of toxicological consequences is used for Building 906.

It is expected that the building radiological inventory and the chemical inventory will change during performance of authorized activities within the constraints of the *RFETS RCRA Permit* (DOE, 1997). Exact hazardous chemical constituents and quantities present in RCRA hazardous wastes are in many instances not known due to lack of precise characterization data. This is not required for regulatory compliance if sufficient other information such as adequate process knowledge exists.

A *low* accident consequence has been assigned to *unlikely* and *extremely unlikely* accident scenarios involving RCRA containerized waste which result in the release of the contents of multiple containers. This *low* accident consequence has been qualitatively assigned based on the low probability of exceeding unity when summing the individual fractions for ERPG-2 at 1900 meters or ERPG-3 at 100 meters for multiple containers of multiple IDCs. This low probability is assumed based on the variety of waste containers present in the building and the very small ERPG fractions determined for waste IDCs typically stored at RFETS as demonstrated by the large numbers of containers required for specific IDCs to exceed thresholds as shown in Appendix C.

The *low* consequence binning from accidents involving multiple containers potentially containing hazardous chemicals is further supported by requirements in *RFETS RCRA Permit* (DOE, 1997). The operating requirements contained in Part B of the RCRA Permit identify multiple consequence mitigation activities. These activities include, but are not limited to, emergency contingency planning; standard conditions for storage areas including storage limits, ignitable waste requirements, precautions to prevent reactions, condition of containers, container compatibility, waste compatibility, aisle spacing and stacking; compliance with the waste analysis plan for characterization, emergency equipment, and personnel protective equipment.

Wastes containing TSCA-regulated material and other special materials such as beryllium may also be present in Building 906. Nuclear Safety Calculation 96-SAE-006 (Kaiser-Hill, 1996c) calculated ERPG fractions for PCB wastes which range from 10^{-8} to 10^{-5}. With values this low, an accident consequence of *low* has been assigned to accident scenarios involving containerized PCB waste. Consequences from acute accidental exposure to beryllium- or asbestos- containing-waste can not be calculated due to the lack of an established measure for acute exposure to these materials. The storage of TSCA-regulated waste must meet all applicable requirements of the TSCA Management Plan (EG&G 1993) which mitigates the probability and consequences of events associated with TSCA waste. Additionally, all hazardous materials must be handled according to industrial hygiene programs and practices which address PCBs, asbestos, and beryllium. Site packaging and handling

3.4.1 Accident Binning

Atmospheric releases of hazardous materials can occur only if one or more of the containers of these materials is breached. As mentioned above, this breaching can occur only through impacts and fires, as it is highly unlikely that any of the containers would have sufficient quantities of volatile materials that they would explode spontaneously (the volatiles would have largely evaporated prior to packaging). Criticalities cannot occur as the amount of radioactive material in the containers is too low to cause a criticality. Mitchell (1993) showed that there is no danger of a criticality from any configuration of any type of LLW or LLMW containers at RFETS.

Specific spills from impacts and fires are discussed below, along with qualitative estimates of the frequency of occurrence and expected consequences of each accident. The frequencies are divided into three broad groups, or bins: *extremely unlikely* (10^{-6} to 10^{-4} per year), *unlikely* (10^{-4} - 10^{-2} per year), and *anticipated* (> 10^{-2} per year). *Incredible* events (< 10^{-6} per year) are not considered. Likewise, consequences are divided into three broad groups, or bins: *high* (significant risk to the public), *medium* (significant risk to the on-site worker but not to the public), and *low* (significant risk only to the local worker). Another group, *negligible*, is even less significant than *low* and is used to mean negligible impact both on-site and off-site. If a consequence is deemed *negligible*, it is not considered further in the analysis.

The waste containers will be stacked to a height of up to 16 feet 6 inches. This corresponds to drums stacked four-high, with forklift pallets or plywood sheets between them, or to some combination of crates, such as three full-size crates, two full-size crates and one half-size crate, or five half-size crates; forklift pallets or plywood sheets would separate the crates. The 24 inch-diameter drums will be in double rows (48 inches) with an aisle spacing of at least 26 inches. The crates (7 feet long) will be in double rows (14 feet) with an aisle spacing of at least 26 inches. If the containers are stacked four high, 9,299 drums would occupy a floor area of about 9,299 ft^2, including their supporting pallets; should the 338 crates be present, they would occupy about 3,192 ft^2 and could displace 3,192 drums. Alternatively, the facility may contain 500 stacks of crates (such as 500 half-size crates and 1,000 full-size crates or 2,500 half-size crates), in which case there would be no drums stored in Building 906. For whatever combination of containers, the floor area occupied would be about 50% of the total floor area. The remainder would be aisles and the battery recharge station.

3.4.1.1 Spills from Impacts

Building collapse (partial or total) caused by natural events (high wind, tornado, earthquake): A building collapse would damage the top layer of containers due to falling girders and roofing and may cause stacks of containers to fall over. A building collapse would expose the top-layer of containers to damage; some damage could also occur to the sides of the containers. There are nine girders supporting the roof, in addition to the walls. These girders are about four feet above the tops of the top layer of containers, as the wall height is 15 feet. Should these girders fall, it is

expected they would breach some of the containers, due mainly to the weight of the girders and roof. It is estimated that no more than 25% of the containers would be breached by falling girders and roofing and stack toppling, should the building collapse. (See Section 3.4.2.1 for a further discussion of this estimate.) This would correspond to the potential release of enough hazardous material that "*low*" consequences may occur for the collocated worker and public. Building 906 is normally unoccupied but should the building be occupied at the time of the accident, potential consequences are considered to be *low*. This binning is appropriate since with collapse of the building the local worker would be expected to only be exposed to material form nearby containers. Indeed, consequences from the earthquake itself would likely be more significant for the local worker than hazardous material exposure. The natural events that the building is designed to withstand include a 109 mph wind, which is expected to occur at least once during the lifetime of the facility. However, a wind this strong would disperse the materials widely and result in negligible consequences. Earthquakes, on the other hand, are not necessarily associated with high winds and the dispersion could be unfavorable, in which case the consequences would be *low*, at most. Earthquakes severe enough to cause Building 906 to collapse are *unlikely* at RFETS (SWEC, 1992).

Airplane crash into building: Jefferson County Airport is five miles east-northeast of the Site and supports small- and medium-size aircraft traffic. According to a study of aircraft accidents (Stalker, 1993), at a distance of five miles from an airport the small aircraft accident rate is conservatively estimated to be about 2×10^{-3} mile^{-2} year^{-1}. The area of Building 906 is about 24,300 ft^2, or about 1×10^{-3} mile^2. The probability of a small aircraft from Jefferson County Airport crashing into Building 906 is therefore about 2×10^{-6} per year. A large-aircraft accident would involve a plane associated with Denver International Airport (DIA). The distance between DIA and the Site is great enough that the large-aircraft crash into Building 906 is incredible and can be eliminated from further analysis. The small-aircraft accident rate is on the edge of being incredible, so will be considered. A small-aircraft crash into the building could cause its partial collapse and release hazardous material much the same as a building collapse caused by natural events, as discussed above, and with similar consequences, that is, *low*. Therefore, this accident is deemed to be in the *extremely-unlikely*, *low*-consequence category. (The fire from this accident is treated below.)

Debris from explosion of acetylene bottle used in welding: If an acetylene bottle used in welding were to leak and cause an explosion (see Section 3.4.1.2) the debris from the explosion would damage many containers. Some of them could be damaged enough to be breached. The amount of material spilled would be small, however, leading to *negligible consequences*. Considering the infrequent use of welding materials in the CWSF and the unlikely occurrence of this type of explosion (training for welders minimizes the possibility of damage to an acetylene bottle), the probability is judged to the *extremely unlikely*. Therefore, this accident is deemed to fall into the *extremely-unlikely, negligible-consequence* category.

report (WEC, 1987) on a study of waste materials in drums, the probability of spontaneous combustion was estimated to be 5.56×10^{-7} per drum per year. For 9,299 drums in the CWSF, this corresponds to a probability of about 5.2×10^{-3} per year, that is, an *unlikely* event. Should a container spontaneously combust, however, much of the material in that container would be released into the atmosphere; since this would happen to only one container at a time, the amount of hazardous materials that would be released would be small and the consequences *negligible*. This accident is therefore deemed to be an *unlikely*, *negligible*-consequence event.

Fuel fire from airplane crash into building: As discussed above, the probability of a small aircraft crashing into Building 906 is estimated to be about 2×10^{-6} per year, *extremely unlikely*. A small aircraft could carry about 200 gallons of fuel. The 200 gallons would correspond to a burn area of about 1,000 ft^2 (Beyler and Hunt, 1992). This is about 4% of the building. If the crash occurred at the location of the greatest concentration of containers, the damage area could correspond to about 8% of the containers. If this were in the crate storage area, the fire could be expected to damage and perhaps even consume all of the crates, as the fire would propagate among the crates. If a long-duration fire occurred in the drum storage area, many of the drums might vent in addition to the burning of any unconfined material, possibly leading to a *moderate*-consequence release.

Maintenance and construction activities - welding: Maintenance activities involving welding may be expected to occur sometime during the life of the facility. Sparks from the welding activity could ignite a wooden crate. This type of fire is estimated to be *unlikely*. It is also possible that the bottle of acetylene used in welding could leak and be ignited by a spark, resulting in a fire or even an explosion. This could damage many containers, breaching some, and possibly causing a significant fire. Because of the training of the welders and nature of this accident, it is deemed to be *extremely unlikely*. For either accident involving maintenance or construction activities, the consequences are estimated to be *low*. Therefore, the welding spark fire is estimated to be in the *unlikely*, *low*-consequence category and the acetylene bottle explosion and fire to be in the *extremely unlikely*, *low*-consequence category.

The estimated probabilities of occurrence and consequences of each accident described above have been binned, as shown in Table 3-7. Those accidents with negligible consequences are not shown in this table. In Table 3-7, the terms Unacceptable, Marginal, and Acceptable are taken from DOE-STD-3009-94 (DOE, 1994a) The most serious accident is selected from this table for further study to determine the bounding-case consequences of these accidents. This is an earthquake causing the building collapse and an aircraft crash induced fire. From Table 3-7 it is seen that all of the accidents considered fall into the "acceptable" category or below. A number of other accident scenarios can also be conceived (such as an asteroid impact or a roof collapsing under a snow load) but these are discounted as being either incredible, or of negligible consequences, or adequately approximated by scenarios already analyzed.

Table 3-7. Binning of Building 906 Accident Scenarios

BUILDING 906 RISK MATRIX - FREQUENCY VS. CONSEQUENCE			
CONSEQUENCE	**FREQUENCY (per year)**		
	10^{-6} - 10^{-4} (extremely unlikely)	**10^{-4} - 10^{-2}** (unlikely)	**above 10^{-2}** (anticipated)
HIGH	MARGINAL none	UNACCEPTABLE none	UNACCEPTABLE none
MODERATE	ACCEPTABLE fire - aircraft crash	MARGINAL none	UNACCEPTABLE none
LOW	ACCEPTABLE fire - electrical fire - acetylene bottle spill - aircraft crash	ACCEPTABLE fire - hydraulic oil fire - welding spark spill - earthquake	ACCEPTABLE none

3.4.2 Accident Evaluation

In order to provide a bounding accident evaluation, the most serious accidents described above were selected for further analysis. The largest spill of hazardous materials results from a building collapse due to an earthquake. The largest release of hazardous materials due to a fire results from an airplane crash into the CWSF and is also discussed. Radiological consequences from a hazardous material release are quantified in terms of Committed Effective Dose Equivalent (CEDE). An approved electronic spreadsheet, BFO Dose Template (Kaiser-Hill, 1996a), was used to calculate the potential dose for the MOI and collocated worker. Copies of the Dose Template with the inputs for the spill and fire scenarios are contained in Appendix C.

In the following analyses, it is assumed that Building 906 contains the maximum allowed radiological inventory of 900 grams of WG Pu and that this entire inventory is contained in the drums or crates involved in the scenario. This is conservative since many of the containers in Building 906 will contain very low levels of contamination which would reduce the amount of material involved in the scenario. If the building were filled with only Pondcrete and/or Saltcrete, it would be less hazardous than using the above approach, as shown below.

3.4.2.1 Earthquake - Spill Hazard

The largest release of hazardous materials following an earthquake would occur with a total collapse of the building. Building 906 is designed according to the Low Seismic Loading requirements, specifically the Performance Category 2 (PC-2) seismic loading requirements as defined in DOE-STD-1020-94 (DOE, 1994c), which will replace UCRL-15910 (Kennedy, *et al.*, 1990). PC-2 is intended for an occurrence probability of exceedance of 1×10^{-3}/yr (return

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period of 1000 years), which for RFETS corresponds to a horizontal ground acceleration of 0.15 g. The probability of complete failure of the building will be lower than the probability of exceedance of the design value. It is therefore conservative to assume a probability of exceedance of 1 x 10^{-3}/yr for an earthquake that would collapse the building.

In the event of the total collapse of Building 906, the top layer of containers (one-fourth to one-third of the total) would be exposed to the falling girders and roofing. Some stacks of containers would also fall, bringing the total number of containers that may suffer damage to about 50% of the building total. Of these, it is estimated that about half, or 25% of the building total, would be breached, allowing their contents to spill.

3.4.2.1.1 Radiological Hazard

For the radiological hazard, the amount of aged WG Pu in the building is assumed to be the maximum inventory allowed for a Nuclear Hazard Category 3 facility per DOE-STD-1027, 900 grams. With a 25% damage ratio, the amount of radiological material involved in the release is 225 grams of WG Pu. The earthquake is treated as a spill initiator using the BFO Dose Template (Kaiser-Hill, 1996a). The potential consequences for the collocated worker and public receptors are given below. Local worker consequences were evaluated qualitatively in Section 3.4.1.

Public: The consequences to the public are first evaluated. Under typical weather conditions (4.5 m/s wind speed and class D atmospheric stability) with a 10-minute release duration, a spill involving 25% of the containers in Building 906 could result in a dose of 2.6E-3 rem for the MOI.

On-Site Worker: For the collocated worker at 100 meters, the potential dose from an earthquake initiated spill is 3.2E-01 rem under typical weather conditions.

3.4.2.2 Fire Hazards

The collocated worker consequences from a fire initiated by a plane crash are bounded by the earthquake initiated spill. The reasons for this are that in a significant fire which involves all the plywood containers in the facility, the plume would be lofted and will burn for at least two hours. The overall effect of plume lofting is reducing dose to the collocated worker since the material will be deposited beyond the collocated worker. This will bin the fire consequences for the collocated worker as *low*. The consequences are binned as *moderate* for the public based on the amount of material potentially released in the spill and therefore burning unconfined.

To verify this consequence binning, even under worst case material assumptions, the BFO Dose Template (Kaiser-Hill, 1996a) was used to calculate potential doses. The assumptions used

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to determine inputs to the template include assuming the entire maximum allowed inventory in the building is present in plywood containers which are conservatively assumed to burn as unconfined combustible waste following the plane crash. The result is a potential dose from this accident of 2.2E-1 rem to the collocated worker and for the MOI a potential dose of 6.5E-01 rem. These consequences and the frequency of this scenario result in binning this scenario as moderate risk per DOE-STD-3011-94 (DOE, 1994b).

3.4.3 Other Storage Arrangements

In the analyses given above, the CWSF was assumed to be filled with up to 9,299 drums and 388 crates, or with 2,500 crates of Saltcrete, or with 2,500 crates of Pondcrete. Many other storage arrangements are possible. The most hazardous configuration would be one in which the full complement of crates is stored with almost 2,500 crates of Pondcrete. (Pondcrete is more hazardous than Saltcrete, both radiologically and chemically.) Even if the CWSF contained 9,299 drums and 388 crates, plus 2,500 crates of Saltcrete, plus 2,500 crates of Pondcrete, a physically impossible configuration, the classification can be maintained as Hazard Category 3 without crediting safety features. This is because the consequence analyses assumed a maximum inventory in the building in the most vulnerable containers (crates) and Pondcrete and Saltcrete result in lower releases due to the waste being cemented.

3.5 CONCLUSIONS

The hazard category of Building 906, when at full capacity according to the expected number of containers, or with 2,500 half-size crate of Saltcrete and/or Pondcrete, or any combination of containers and Saltcrete and Pondcrete, is Hazard Category 3, at most. Because of the conservative estimates that were made of the quantities of hazardous materials in the containers, the true hazard may, in fact, be below Hazard Category 3. In the case of the radiological hazard, the amount of WG Pu may be below the Hazard Category 3 cutoff, 8.4 grams; Appendix B, for example, shows that in most cases where the amount of actinide was measured, the amount was zero. It is not expected that americium is present in quantities greater than previously evaluated for Building 906. However, for low-level waste, the difference in dose consequence between aged WG Pu and pure americium would not be sufficient enough to change the conclusions of the accident analyses regarding the significance of potential consequences for the MOI or the collocated worker (USQD, 1997). Similarly, for the toxicological hazard, the sum of the ERPG-3 fractions for the local worker is expected to fall below one for the spill caused by an earthquake, thus rendering the facility below low hazard; for the airplane crash, the sum of the ERPG-3 fractions is estimated to be even smaller than for the spills caused by the earthquake.

It should be noted that even though Building 906 has smoke and fire detection and alarm systems, to alert the workers and fire department, and a sprinkler system to suppress a fire, no credit has been taken for these as the consequences of the worst credible accident are acceptable without the need to credit any mitigation systems. No special hazard control is needed beyond those specified in the Technical Safety Requirements (Chapter 4).

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WEC, 1987 — *Waste Drum Fire Propagation at the Waste Isolation Pilot Plant*, **DOE/WIPP-87-005**, Westinghouse Electric Company, Carlsbad, NM, April 1987.

CHAPTER 5

SAFETY MANAGEMENT

5.1 INTRODUCTION

This chapter describes the institutional safety management programs that apply to Building 906. The objective of these programs is to instill an overall safety culture at the plantsite and thus enhance safety in general through formal disciplined methods of conducting business and operations such that the potential for accidents is minimized. Although none of these programs are directly credited in the accident analysis, and thus are not required to maintain the safety envelope established in the accident analysis, they are of great importance in the safe operation of Building 906. The key programs are therefore required to be implemented at all times that Building 906 is in operation as required by the administrative control TSR (Chapter 4). The discussions provided here are only intended to describe the salient features of the program as they relate to Building 906 and not to be the mechanism for review and approval of the programs.

5.2 RADIOACTIVE AND HAZARDOUS MATERIAL PROTECTION

Potential hazards in Building 906 exist from proximity to stored low level radioactive waste, leaks from various containers and spills occurring during waste transport. Controls to minimize the hazard from contamination include use of contamination reduction measures such as personal protective equipment and proper material handling procedures. These controls are described in and implemented through the Health and Safety Practices (HSP) Manual. Key elements of the radioactive and hazardous material protection controls are discussed below.

5.2.1 ALARA Program

The ALARA program is designed to minimize radiological exposure at the Rocky Flats Environmental Technology Site (RFETS) below the limits established by DOE. The ALARA program is outlined in the HSP, ALARA Goals in Reducing Personnel Radiation Doses (EG&G, 1990a) and defines line management responsibilities and policy, requirements, and guidelines for implementing the ALARA program. The Operations Manager is responsible for implementing the ALARA program and establishing the ALARA goals. Support for the program is provided by the Health and Safety Area Manager, Radiological Engineering Manager, Radiological Operations, design personnel, and the Performance-Based Training Staff. Radiation workers are responsible for minimizing both their personal exposure and the spread of radioactivity by complying with safety requirements, reporting any radiological problems, and following established good work practices.

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5.2.2 Personnel Radiation Exposure Control and Dosimetry

The radiation exposure control and external dosimetry program are defined in *HSP, Radiation Dose Control* (EG&G, 1992c) and *HSP, External Radiation Dosimetry* (EG&G, 1993d), respectively. Potential intakes of radioactive material into the body are minimized at RFETS. The criteria for evaluation of potential intakes and required actions are detailed in *HSP, Criteria and Actions for Potential Intakes* (EG&G, 1992a). Annual effective dose equivalents are determined by combining external and internal dose equivalents.

5.2.3 Radiological Monitoring and Contamination Control

Activities involving radioactive materials at RFETS are controlled and conducted in a manner which minimizes the potential for release of radioactive contamination to personnel, the facility, and the environment. Contamination control barriers are used whenever possible to prevent contamination release. Monitoring of individuals and areas is performed to demonstrate compliance with DOE requirements, to document conditions in the workplace, to detect changing radiological conditions, to identify the gradual buildup of contamination, and to verify the effectiveness of process and engineering controls.

Contamination control requirements are detailed in *HSP, Personnel Contamination Control Requirements for Radiologically Controlled Areas* (EG&G, 1993f) and *HSP, Radioactive Contamination Control and Decontamination* (EG&G, 1993h). Procedures for the release of property for conditional or unrestricted use are contained in *HSP, Release of Property/Waste for Conditional Unrestricted Use* (EG&G, 1993i). Routine contamination smear surveys are collected and counted. Smear survey locations may include walkways, storage locations, entrances, exits, offices, and break areas.

5.2.4 Radiological Protection Training

All personnel with unescorted building access are provided with courses in General Employee Training which provides basic instruction in radiation protection and ALARA, Nuclear Materials Safeguards, Hazard Communication, RCRA Classroom, and RCRA On-the Job Training (OJT). For controlled area entry, specific courses such as: Protecting the Radiation Worker, Respirator Indoctrination, Respirator Fit training, and Building or Area Specific Indoctrination are required. Periodic retraining is required.

5.2.5 Hazardous Material Protection

The Industrial Hygiene and Safety department's primary function is to ensure a work environment that limits personnel exposure to physical, chemical, and biological hazards. Industrial Hygiene and Safety is responsible for *HSP, Hazard Communication Program*, (EG&G, 1993e). Chemical exposure in Building 906 is limited to waste forms if spilled. Physical hazards are limited to those associated with waste container handling, forklift accidents,

electrical shocks, and other normal hazards associated with warehousing and storage operations. No biological hazards are expected.

5.2.6 Air Monitoring

The objective of chemical air monitoring is the characterization of dust, fumes, gas and vapors present in Building 906. The *Industrial Hygiene Procedures Manual* (EG&G, 1990b) describes specific monitoring procedures.

5.2.7 Hazard Communication

Building 906 maintains a hazard communication program in accordance with Workers "Right to Know" regulations, Title 29 Code of Federal Regulations Part 1910, Subpart 1200. This program is outlined in the RFETS *Health and Safety Practices* (EG&G, 1993e).

5.3 WASTE MANAGEMENT PROCESSES

Because Building 906 serves only as a storage facility for waste generated plant wide prior to off-site shipment, hazardous or radioactive waste will be infrequently produced by the operation of Building 906. Aside from container overpacks or container physical protection devices, waste containers will not be opened. A small amount of radioactive waste will be produced in Building 906 from normal radiation monitoring activities and a limited amount of decontamination. Radioactive waste will be handled in accordance with Radiological Operation Instructions procedures.

Non-radioactive hazardous wastes generated at Rocky Flats are subject to the following requirements: The Colorado Hazardous Waste Regulations specified in 6 CCR 1000 Subpart 260-271 (CCR, 1987); the Resource Conservation and Recovery Act (RCRA) specified in 40 CFR 260-271 (CFR, 1992); and DOE Order 5480.3 (DOE, 1985).

5.4 PROCEDURES and TRAINING

This chapter documents the processes by which the technical content of procedures is developed, verified, and validated. It also describes the training regimen that Building 906 employees undergo in order to perform their tasks safely.

5.4.1 Procedures

Activities conducted in Building 906 are controlled by the Environmental Waste Management (EWM) Group at Rocky Flats Plant and are documented in EWM procedures. These procedures are developed, verified, and validated in accordance with a procedure on development of procedures, *Procedure Process* (EG&G, 1993). This procedure describes the

overall responsibilities and activities for preparing, reviewing, approving, revising, controlling, and tracking procedures. These procedures apply to all EG&G personnel and to contractors working directly with EWM.

5.4.2 Training

The mission at RFETS is to provide well trained and qualified employees who are able to perform or supervise work activities in a safe, efficient, and environmentally sound manner. The development, conduct, and administration of training are accomplished by the Training organization through compliance with applicable DOE Orders and standards, federal and state regulations, and plant policies and procedures. The training organization analyzes identified training needs and designs and develops (or assists in the design and development of) training which is then implemented by qualified instructors.

Evaluation is performed at each stage of this process. In conjunction with the Documents and Qualification groups, the Training organization evaluates task based evolutions to provide the necessary level of training. In cooperation with the line organizations, the development of Qualification Standards Packages and implementation of Qualification programs are developed. In addition, Training controls and maintains the quality records associated with RFETS training activities including training material (course) files, individual employee training histories, and individual qualification records. Scheduling, logistics, and administrative coordination of training activities are also provided by this organization.

5.4.3 Qualification

The qualification process is designed to ensure that employees in specific job classifications, ranging from individual operators to Operations Managers, are able to perform their job tasks in a manner that protects personnel, the public, and the environment. Qualification is defined in terms of education, experience, training, and any special requirements necessary for the performance of assigned responsibility. This process is documented through execution of a Qualification Standard Package (QSP). Each element of the QSP supports mastery of knowledge and skills.

5.5 INITIAL TESTING, IN-SERVICE SURVEILLANCE, and MAINTENANCE

This section would normally address the safety significant and safety class Structures, Systems, and Components (SSCs) which require a program to assure their functionality. Because Building 906 is a Hazard Category 3 facility, it does not require safety significant or safety class SSCs to assure safe operation. The only surveillance activity required to maintain Building 906 within the bounds of the analyzed safety envelope are those listed in the Technical Safety Requirements (TSRs) in Chapter 4. The TSR simply requires that the inventory of

radioactive and hazardous material be kept below the maximum quantities analyzed in the accident analysis (Chapter 3) and that key safety management programs be instituted.

5.6 CONDUCT OF OPERATIONS

An effective COOP creates a safe and responsible work atmosphere. Site-wide implementation of COOP at RFETS is provided by the COOP Manual which contains procedures COOP-001 through COOP-021 as required by DOE Order 5480.19 (DOE, 1992). The degree to which the COOP is applicable to any given facility is determined by performing a Level of Applicability (LOA) review in accordance with Section 2 of COOP-1.

5.7 QUALITY ASSURANCE

This section provides information about the Quality Assurance Program at the RFETS as it applies to the operation of Building 906. The Associate General Manager of Standards, Audits, and Assurance is chartered with development and overall responsibility for the RFETS Quality Assurance Program. For the 906 Building, the Environmental Waste Management (EWM) Associate General Manager is the line manager with responsibility for implementing the RFETS QA Program within the EWM organization, ensuring compliance of the organization, and integrating the QA philosophy in all aspects of the organizational responsibility, *Quality Assurance Manual* (EG&G, 1993k).

The QA requirements at RFETS are based on DOE Order 5700.6C, *Quality Assurance* (DOE, 1991b) and DOE-RFO Quality Assurance Requirements for RFETS Management and Operations and are implemented through EG&G 1992d and the *Environmental and Waste Management Quality Assurance Management Plan* (EG&G, 1993b), and other flow-down documents.

A program-specific QA plan is developed by line management as early as possible to identify the basic elements of applicable RFETS QA program requirements. The program-specific QA plan and program-specific H&S plan include:

- Evaluation of the operations to determine necessary management controls;
- Information regarding organization, responsibilities, procedures, and QA records;
- Evaluation of the operations against the basic elements and supplements of the RFETS QA Program requirements;
- Identification of required implementation procedures for each applicable element to satisfy the requirements specific to the activity; and

- Identification of operating procedures and other management controls used to implement and control a given element.

The completed QA plans provide documentation of the program's or operation's ability to satisfy Quality Assurance Manual requirements and RFETS Operational Safety Requirements. Guidance on preparation of QA plans is contained in *Preparation, Review, and Approval of Quality Assurance Plans* (EG&G, 1993s).

The E&WM Quality Assurance Program Description addresses site-wide responsibilities and requirements applicable to E&WM directorates. The E&WM Quality Assurance Program Description provides the basis for development of individual departmental QA program plans. The Waste Management QA division has developed the Waste Management Quality Assurance Program Plan, which provides a comprehensive quality program for Waste Operations and Waste Programs and addresses all RFETS waste. The QA program plan and low-level waste management plan are required for certification of radioactive, hazardous, or mixed wastes for off-site transport. The low-level waste management plan is a site-wide program that describes the systems and procedures in place to meet the requirements for waste process control and certification. The *Low-Level Waste Management Plan* (EG&G, 1992b) incorporates control plans, which address requirements for the specific waste streams.

5.8 HUMAN FACTORS

Because there are no safety significant or safety class SSCs in Building 906, no human factors considerations are required.

5.9 DECONTAMINATION and DECOMMISSIONING

Building 906 is presently intended to be used as a waste storage facility throughout its useful life. No plans exist for the building to be converted to any other use in the future. It is probable that the building's useful life will extend until such time as the entire RFETS complex completes the environmental restoration, decommissioning, and decontamination mission.

When the building has fulfilled its purpose, it will be decontaminated and decommissioned (D&D). Detailed D&D plans will be developed prior to cessation of building operations, at the point in time when the end of the building's useful life can be reasonably identified. The waste stored in Building 906 is generated elsewhere and is stored in containers which are not expected to leak. Because only small amounts of wastes will be generated in Building 906 and because, under normal operations, the building is not expected to become contaminated, the residual contamination present at the time of decommissioning should be minimal. Further, if an accident results in contamination, the relatively smooth walls and epoxy coated floors will facilitate decontamination efforts and minimize the residual contamination at the time of D&D.

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Decommissioning of Building 906 will comply with the requirements of the National Environmental Policy Act (CFR, 1969); DOE Order 5820.22, Chapter 5; 40 CFR 264, Subpart G; 6 CCR 1000, part 265, Subpart G; as well as other contractual or legal requirements that may exist at the time of decommissioning.

5.10 EMERGENCY PREPAREDNESS

The Emergency Management System in the US Department of Energy (DOE) is outlined in the 5500 Series of DOE Orders. DOE Order 5500.3A, Planning and Preparedness for Operational Emergencies, identifies 13 program elements for implementing an emergency management program including development of an emergency response capability. These requirements apply to both the RFETS site-level and building-specific emergency programs. The 13 EP program elements are:

1. Emergency Response Organization
2. Offsite Response Interfaces
3. Operational Emergency Event Classes
4. Notifications and Communications
5. Consequence Assessment
6. Protective Actions
7. Medical Support
8. Reentry and Recovery
9. Public Information
10. Emergency Facilities and Equipment
11. Training
12. Drills and Exercises
13. Emergency Management Program Management

5.10.1 Rocky Flats Plant Emergency Response

The RFETS Emergency Plan (EPLAN, EG&G, 1993a) and Implementing Procedures identify the RFETS Emergency Response Organization (ERO) and provide directions for emergency response at the plant. The EPLAN has been approved by DOE/RFO and DOE HQ.

5.10.2 Emergency Facilities and Equipment

Emergency facilities and equipment are outlined in detail in the RFETS EPLAN. Building-specific emergency equipment is addressed in the Building 906 Emergency Plan.

5.10.3 Training

Emergency response training for the RFETS populace is provided in General Employee Training (GET) and in building indoctrination training classes. Computer based training provides additional training on specific hazards and respirator usage. All ERO members receive performance-based training prior to performing EMERGENCY duties. First Responder training is in accordance with OSHA and 29 CFR requirements. Training certification for functional positions (*e.g.* Fire Department Emergency Medical Technicians, *etc.*) is maintained through functional training.

5.10.4 Drills and Exercises

Building drills are scheduled and conducted by the Building 906 Management Staff in accordance with procedure 1-A35-5500-09.24, Scheduling and Conducting Building Emergency Drills. Participation in Site-wide exercises, as required, is in accordance with 1-64000-ADM-09.25, Scheduling and Conducting Site Emergency Response Drills and Exercises.

5.11 SAFETY ASSURANCE

5.11.1 SAR, USQD, CCCP, COOP, and IWCP Programs

Several key programmatic documents are intended to maintain safe operations at RFETS. These documents are intended to maintain the safety envelope established in the SAR and include: the Unreviewed Safety Question Determination (USQD) (EG&G, 1993q) process, the Configuration Change Control Program (CCCP), the Conduct of Engineering Manual (COEM), the Conduct of Operations Program (COOP), and the Integrated Work Control Program (IWCP).

The SAR provides an accident analysis of the facility to ensure the consequences of any credible foreseen accident would not place the health and safety of the public at undue risk. The accident analysis thus helps to define the operational safety envelope of the building and constitutes the authorization basis of the facility The SAR is reviewed, using the USQD process, when facility changes are proposed to determine if the change is enveloped by the existing accident analysis.

The USQD process is intended to provide a review of proposed changes or new activities to determine if the proposed activity is enveloped by the accident analysis. If the existing accident analysis does envelope the proposed activity, the change can proceed without prior DOE approval. If not, an unreviewed safety question exists and the accident analysis must be revised to address the proposed change and approved by DOE prior to performing the proposed change. In this way, the USQD process ensures continuing validity of the accident analysis (and the resultant health and safety of the public as a facility evolves).

The CCCP program is the process which, among other things, ensures that nuclear facility changes receive a USQD review. Additionally, this program invokes an integrated program of configuration management and change control for all facilities, systems, processes, and grounds at RFETS. The detailed procedures which implement the CCCP are contained in

however they thought that this may be compensated for by the increased surface area and particulate coating decreasing the filters ability to release the contained liquid.

< Water is representative of carbon tetrachloride, except for its rates of evaporation and diffusion. It is realized that the non-polar and heavy solvent will not be retained to the degree that water is. This conservative assumption has been made to account for any discrepancies or deviations introduced by differences in filters or particulate loading.

< The single filter used for the study is representative of all filters. These filters come from many suppliers in a variety of configurations. It is assumed that the conservative assumptions made above will bound any deviation introduced by differences between filters and filter types.

RFETS procedures require that these filters be drained for a minimum of eight hours prior to disposal. From the above experiment, it appears that the initial drop in weight of the filter is due to drainage, as the weight drops quickly in the first few minutes then levels off at about 15 oz, of which 10 oz is water (dry filter weight is 5 oz). The remaining drop in weight is most likely due to evaporation, being one to two ounces during the next several hours. Because carbon tetrachloride has a specific gravity of 1.6, the amount of carbon tetrachloride remaining on the filter after drainage would be about 16 oz. However, carbon tetrachloride is more volatile than water, evaporating about 20 times faster at room temperature. However, because of its high molecular weight, it diffuses through the filter about three time slower than water. Thus, one would expect the effective evaporation rate to be about 20/3 or seven times faster than for water. Thus the evaporation of one or two ounces of water would correspond to an evaporation of 7 to 14 ounces of carbon tetrachloride. Using the more conservative figure (7 oz), the remaining carbon tetrachloride would weigh about 9 oz or 64% [= 9/(9+5)] of the total (loaded) filter weight.

WASTE CONSTITUENT	Corrected Concentration
carbon tetrachloride	640,000 ppm (64%)

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APPENDIX C

WASTE CHARACTERIZATION AND CONSEQUENCES

This appendix contains the results of two activities to characterize waste at RFETS which were performed outside of efforts directly supporting Building 906 and spreadsheets showing radiological consequences. The first activity provides information regarding toxicological characterization of waste and the second information regarding the radiological characterization of low-level waste. This information is included to characterize the possible inventory of Building 906 when the number and container-type for specific IDCs is not controlled allowing any properly packaged low-level or low-level mixed IDC to be stored in accordance with the RCRA Permit for Building 906..

C.1 TOXICOLOGICAL RANKING

The following tables were extracted from the Building 664 FSAR. The IDCs listed in the table were characterized using the same statistical method as discussed in Appendix B of this document. Many of these IDCs could be stored in Building 906 if they are identified as low-level waste. As can be seen form the table it would take hundreds of even the worst case container to exceed the toxicological threshold for the collocated worker and thousands of containers to exceed the MOI toxicological threshold.

APPENDIX D

REVISION SUMMARY

D.1 INTRODUCTION

The USQDs and TSR revisions listed in this appendix were incorporated into revisions to the Building 906 FSAR.

D.2 REVISION 1, AUGUST, 1995

USQD-906-95.0445-ARS, Permanent Addition of Full-Crates, Half-Crates, and 55-Gallon Drums For Storage in Building 906

USQD-906-95.0887-ARS, Triwall and Crate Substitution, Building 906

Pages changed: iii, iv, v, 2-1, 2-3, 2-4, 3-3, 3-5 thru 3-7, 3-12, 3-13, 3-19 thru 3-21, 3-24, 3-27, 3-29 thru 3-35, added Appendix D

D.3 REVISION 2, AUGUST, 1996

USQD-906-96.0102-ABR, Drum & Crate Stacking in Building 906

Pages changed: ii, iii, vi, 2-1, 2-3, 2-8, 2-9, 3-5, 3-24, 3-26, 4-5, 4-6, 5-5 through 5-13, and D-2

D.4 REVISION 3, APRIL 1997

TSR page change, PGC-906-97.0290-GKE, revised LCO 4.3.1 to be only a radiological inventory control. The FSAR revision required to support this change was a complete revision to Chapter 3 and other minor changes.

Revision 3 also incorporated minor descriptive information revisions noted by RFFO in their Safety Evaluation Report for Building 906.

D.4 REVISION 4, AUGUST 1997

Revision 4 incorporated information from USQD-906-95.0887-ARS and USQD-RFP-97.0510-TLF. Editorial clarifications and corrections were also incorporated.

Pages changed: iv, 1-1, 2-1, 2-3, 2-4, 3-1 through 3-6, 3-11, 3-15, 3-16, 3-19 through 3-23, 5-1 through 5-8, B-20, C-2, and D-2; added page 3-6a.

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ATTACHMENT 2

TSR CHANGES TO BUILDING 906 FSAR, PGC-906-97.1198-MAN

Rocky Flats Environmental Technology Site

4/8

TSR REVISION COVER SHEET

TSR Revision No. PGC-906-97.1198-MAN		Building #	Page 1
Title TSR CHANGES TO BUILDING 906 FSAR		906	of 8
		Charge # NH774000	

Preparer	M. A. Natzke Safety Analyst, E2	Michael A. Natzke (Sign Name)	Date 8/25/97
Reviewer	J.N. Conyers Safety Analyst, E2	J N Conyers (Sign Name)	Date 8/25/97
Manager, AB	D. R. Swanson Team Leader, RMRS AB	D. Swanson (Sign Name)	Date 8/26/97
Manager, Kaiser-Hill Nuclear Engineering	H.E. Gilpin /S Crowe (Print Name)	H. E. Gilpin /S Crowe (Sign Name)	Date 8/26/97
V. P., RMRS Program Compliance	T. W. Overlid (Print Name)	T W Overlid (Sign Name)	Date 8/27/97
ORC Mtg. No. RMRS 97-042	Asa Reed Jr (Print Name)	A Reed Jr (Sign Name)	Date 8/27/97
Responsible Manager	S.W. Dewitt (Print Name)	S W Dewitt (Sign Name)	Date 8/26/97
Facility Manager	P.M. Sauer (Print Name)	TE Rusche for P M Sauer (Sign Name)	Date 8-26-97

Note 1 Preparer	Note 2 Reviewer	Note 3 Manager, TSR/OSR Support	Note 4 Manager, Kaiser-Hill Nuclear Engineering	Note 5 ORC

Note 6 Responsible Manager	Note 7 Facility Manager	Note 8 Revision No.	Note 9 New TSR Revision Required ☐	
			Yes	No

Note 1: The Preparer initials for revision of TSR Revision.
Note 2: The Reviewer initials for revision of TSR Revision.
Note 3: Manager, TSR/OSR Support initials for revision.
Note 4: Manager, Kaiser-Hill Nuclear Safety initials for revision.
Note 5: ORC initials for revision.
Note 6: Responsible Manager initials for revision.
Note 7: Facility Manager initials for revision.
Note 8: Revision No. of the TSR Revision.
Note 9: Check ( ) if revision significant to require reevaluation. Initials above needed to confirm only No determinations and a justification is required.
Note 10: Changes to this TSR Revision shall be made by a TSR Revision Evaluator.
Note 11: Mark not applicable signature blanks "N/A".

REVIEWED FOR CLASSIFICATION/UCNI
By J. N. CONYERS UCNI
Date 8/25/97

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TECHNICAL SAFETY REQUIREMENT REVISION

TSR Revision Number: PGC-906-97.1198-MAN

REVISION - DOCUMENTATION SHEET

Revision Number	Date	Describe Changes Required for Revision or Justification for 'No Evaluation' Required
0	8-25-97	Original Issue of PGC-906-97.1198-MAN

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EXECUTIVE SUMMARY

This proposed Technical Safety Requirement (TSR) revision affects Chapters 4 and 5 of the Building 906 Final Safety Analysis Report (FSAR). Three issues are addressed: (1) an update to reflect the current ORC structure by deleting references to the Safety Review Board and adding the RMRS ORC, (2) an editorial clarification regarding the administrative control TSRs, and (3) an editorial correction to reflect the name change of the Rocky Flats Plant to the Rocky Flats Environmental Technology Site.

The proposed changes are described in Section 4 and the technical justification for the changes are provided in Section 5 of this TSR revision document.

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3.0 Safety, Operating Function, and Operating Conditions Identification 5

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5.0 Technical Justification 7

APPENDIX 1: Building 906 FSAR: Current Pages and Proposed TSR Changes

APPENDIX 2: USQD-906-97.1199-RAB, TSR Changes to the Building 906 FSAR

1.0 DESCRIPTION AND PURPOSE OF PROPOSED ACTIVITY

The proposed changes to the Technical Safety Requirements require DOE approval prior to incorporation into the Building 906 FSAR. The first proposed change affects the administrative control TSRs and reflects changes in the Independent Safety Review structure at RFETS. The Safety Review Board is no longer in existence and the Building ORC is now referred to as the RMRS ORC. The other two proposed changes are editorial in nature and are included for clarification and accuracy. The proposed changes are described further in Section 4.0 of this document.

2.0 REFERENCE DOCUMENTS

a) *Building 906 Final Safety Analysis Report*, Rev. 3, April 1997.

b) DOE Order 5480.21, *Unreviewed Safety Questions*, December 24, 1991.

c) DOE Order 5480.22, *Technical Safety Requirements*, September 15, 1992.

d) Letter from A.P. Power to D.W. Croucher, Operations Review Committee Self-Assessment, APP-002-97, January 30, 1997.

3.0 SAFETY, OPERATING FUNCTION, AND OPERATING CONDITIONS IDENTIFICATION

Building 906 is used to store solid low-level waste (LLW), Low Level Mixed Waste (LLMW), and hazardous chemical waste (HAZ). These wastes are a combination of materials that have been generated by past operations at RFETS and waste materials that will be generated in the future during normal operations and as part of the Decontamination and Decommissioning (D&D) activities.

The safe operation of the facility is achieved through implementation of TSRs as outlined in Chapter 4 of the FSAR. These requirements include inventory control and administrative controls that are relied upon for the safe operation of the facility. Included in these controls are limitations to the scope of activities performed within the facility, controls on the specific waste materials admitted for storage, container types, container packaging requirements and the total quantity of radioactive or hazardous materials allowed.

4.0 SUMMARY OF CURRENT REQUIREMENTS AND PROPOSED CHANGES

Administrative Control TSR 4.4.4, Independent Safety Reviews, Audits, and Self-Evaluation Program outlines the functions and responsibilities of the Independent Safety Review Program at RFETS as they relate to Building 906. Proposed TSR Change 1 reflects changes in the organizational structure at RFETS. The Safety Review Board is no longer in existence and the Building ORC is now referred to as the RMRS ORC. A change to Chapter 5 of the FSAR is required to accommodate the proposed change to Chapter 4.

The second proposed change is an editorial clarification in Chapter 4 regarding the administrative control TSRs. The same information was presented twice. The third proposed change is an editorial correction to reflect the name change of the Rocky Flats Plant to the Rocky Flats Environmental Technology Site. This change affects many pages throughout the document. The proposed changes to the Building 906 FSAR are provided below.

Proposed TSR Change 1
Delete references to the Safety Review Board and replace references to the Building ORC with the RMRS ORC.

Page 4-8, Section 4.4.4.1. Change sentence to read: The Operations Review Committee (ORC) applicable to Building 906 is the RMRS ORC.

Page 4-8, Section 4.4.4.1.1. Change first sentence reference of "Building ORC" to "RMRS ORC."

Page 4-9, Section 4.4.4.1.1. Delete subsection "d."

Page 4-9, Section 4.4.4.1.2. Change first sentence reference of "Building ORC" to "RMRS ORC."

Page 4-9, Section 4.4.4.1.2.f: Change to read: Other safety significant activities as identified by the Operations Manager or the Operations Review Committee which could potentially affect the safety of personnel, the public, or the environment.

Page 4-10, Section 4.4.4.2.1. Delete subsection "d."

Page 5-9, Section 5.11.2. Delete second and third sentences.

Proposed TSR Change 2
Editorial clarification. Clarify the first paragraph and delete third paragraph.

Page 4-1, Section 4.2. Change the first paragraph to read:
Because Building 906 is a Hazard Category 3 facility used only for waste storage, inventory control TSRs are required for Building 906 to limit building inventory of radionuclides. These inventories must remain at or below the levels analyzed in the accident analysis. Administrative control TSRs are also required to assure that the safety management controls, which act to ensure continued safe operation of the facility, are in place when the facility is operational. More detailed descriptions of the programs and the procedures that implement them at RFETS are provided in Chapter 5. The inventory and administrative control TSRs are required to keep Building 906 within the safety envelope analyzed in the accident analysis. This approach is suggested by DOE (DOE, 1992; Stello, 1993; and Grethel, 1993) for Hazard Category 3 facilities.

Proposed TSR Change 3
Editorial change. Replace "Rocky Flats Plant" or "RFP" with "Rocky Flats Environmental Technology Site" or "RFETS" as appropriate.

Pages 4-1, 4-4, 4-10, and 4-11.

5.0 TECHNICAL JUSTIFICATION

Proposed TSR Change 1
Delete references to the Safety Review Board and replace references to the Building ORC with the RMRS ORC.

Justification: The Safety Review Board is no longer in existence. The Building ORC is now referred to as the RMRS ORC. Reference: Letter from A.P. Power to D.W. Croucher, Operations Review Committee Self-Assessment, APP-002-97, 1/30/97.

Proposed TSR Change 2
Editorial clarification. Clarify the first paragraph and delete third paragraph.

Justification: The language was not clear in the first paragraph and the third paragraph was redundant.

Proposed TSR Change 3
Editorial change. Replace "Rocky Flats Plant" or "RFP" with "Rocky Flats Environmental Technology Site" or "RFETS" as appropriate.

Justification: Reflect name change to Rocky Flats Environmental Technology Site.

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APPENDIX 1

BUILDING 906 FSAR:
CURRENT PAGES AND PROPOSED TSR CHANGES

CHAPTER 4

TECHNICAL SAFETY REQUIREMENTS

4.1 INTRODUCTION

This chapter describes the derivation of the Technical Safety Requirements (TSR) for Building 906. The TSRs are included as Sections 4.3 and 4.4 of this chapter.

4.2 *DERIVATION OF TECHNICAL SAFETY REQUIREMENTS*

Because Building 906 is a Hazard Category 3 facility used only for waste storage, the only TSRs required for Building 906 are those that limit building inventory of radionuclides. These inventories must remain at or below the levels analyzed in the accident analysis. An administrative control TSR to require that the key safety management programs be in place during operation of the facility is also required. Both of these TSRs are required to keep Building 906 within the safety envelope analyzed in the accident analysis. This approach is suggested by DOE (DOE, 1992; Stello, 1993; and Grethel, 1993) for Hazard Category 3 facilities.

The waste stored in Building 906 will be categorized by Item Description Codes (IDCs) and written descriptions which can be used to determine the radionuclide content used in the accident analysis (Chapter 3). The waste will be hazardous, low-level and low-level mixed waste in drums or crates. These waste forms and drum or crate quantities were used to determine both the Hazard Category of the facility and the consequences of various accidents. The category thresholds in DOE-STD-1027-2 determine the upper inventory limit that must not be exceeded and is controlled by a TSR. The resultant TSR is provided as Section 4.3 of this chapter.

Administrative TSRs are also required. These TSRs assure that the safety management controls, which act to ensure continued safe operation of the facility, are in place when the facility is operational. More detailed descriptions of the programs and the procedures that implement them at Rocky Flats are located in Chapter 5.

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B 4.3 TECHNICAL SAFETY REQUIREMENTS, INVENTORY LIMIT

B 4.3.1 Centralized Waste Storage Facility (CWSF) Storage Limits

BASES

BACKGROUND

Building 906 is the Centralized Waste Storage Facility (CWSF) at the Rocky Flats Plant (RFP). The CWSF is used to store hazardous waste materials, in particular low-level waste (LLW), low-level mixed waste (LLMW), and hazardous chemical waste (HAZ). These wastes are a combination of materials that have been generated by past operations at RFP and waste materials that will be generated in the future as part of normal operations and the Decontamination and Decommissioning (D&D) activities at RFP.

Based on the inventory thresholds identified in DOE-STD-1027-92 and the amount of hazardous material stored within this facility, Building 906 is considered a Hazard Category 3 facility for radionuclides as well as for hazardous chemicals.

APPLICABLE SAFETY ANALYSES

As described in Chapter 3, the Waste and Environmental Management System (WEMS) computer tracking system was queried to establish the amounts of radioactive and chemical material in waste forms destined for the CWSF. The identification of hazardous materials stored in these containers is based on process knowledge and a knowledge of where the waste originated. Upper limits on these amounts were estimated from a statistical analysis of available data, such as assays. In addition, analytical sampling data were used in estimating the upper limits.

DOE-STD-1027-92 establishes different Hazard Categories based on the total building inventory of radionuclides. For the types of waste to be stored at the CWSF, ^{239}Pu is the limiting isotope. The threshold values for ^{239}Pu for Hazard Category 3 and Hazard Category 2 are 8.4 and 900 grams, respectively. The primary goal of LCO 4.3.1 is to protect the Hazard Category 3 classification by not allowing radionuclide inventory to exceed the limits established in DOE-STD-1027-92. LCO 4.3.1 limits the total quantity of radionuclides to $\leq$ the 900 gram upper limit of ^{239}Pu, or the limits established for any of the other isotopes in DOE-STD-1027-92.

4.4.3 Training

4.4.3.1 A training and replacement training program for facility staff shall be maintained under the direction of the Building 906 Operations Manager.

4.4.3.2 Individuals who operate, maintain, provide support, or supervise activities in Building 906 shall receive training in the nuclear safety and hazardous materials aspects of their jobs including specific activities related to the CWSF. Each member of the facility management, operating staff, and supporting personnel shall demonstrate that they meet the minimum skills and knowledge qualifications for their job responsibilities.

4.4.3.3 Training shall address procedures, Technical Safety Requirements (TSRs), Configuration Change Control, Conduct of Operations, radiation protection, respiratory protection, industrial safety, and hazardous materials. In addition, training shall also address the location and function of safety equipment. Operations personnel and supervision shall also receive annual emergency preparedness training in accordance with DOE Order 5480.5.

4.4.4 Independent Safety Reviews, Audits, and Self-Evaluation Program

4.4.4.1 Safety Reviews

The Safety Review Board shall provide oversight of the Operations Review Committee (ORC) that is applicable to Building 906 (herein referred to as the Building ORC).

4.4.4.1.1 Functions

The Building ORC shall conduct independent safety reviews which as a minimum, incorporate the following functions:

a. Perform independent safety reviews of facility programs and activities and advise the Operations Manager on all matters related to nuclear and hazardous material safety.

b. Recommend to the Operations Manager approval or disapproval of programs and activities, and which of these may present an Unreviewed Safety Question (USQ), prior to their implementation.

c. Review proposed tests or experiments and proposed modifications to systems or equipment that may affect nuclear or hazardous material safety, prior to

implementation.

d. Notify the Safety Review Board of any safety significant disagreement between the review organization and the Operations Manager.

4.4.4.1.2 Responsibilities

The Building ORC shall conduct, as a minimum, independent safety reviews for the following programs and activities:

a) Maintenance or modifications involving safety significant activities such as chemical or toxicological hazards which may affect the safety of personnel, the public, or the environment.

b) Proposed tests, experiments, and normal or abnormal operations, that could pose potentially significant radioactive or nonradioactive hazards to workers, the public, or the environment.

c) Procedures.

d) TSRs and changes thereto.

e) An unplanned, uncontrolled, unmonitored, or unfiltered release of radioactive or hazardous material with the potential to significantly affect personnel, the public, or the environment.

f) Other safety significant activities as identified by the Operations Manager, the Safety Review Board, or the Operations Review Committee which could potentially affect the safety of personnel, the public, or the environment.

g) Reportable occurrences.

h) Safety evaluations

(01)

4.4.4.2 Audits

4.4.4.2.1 Functions

The Operations Manager shall submit the items required for the performance of facility appraisals and assessments in support of the Independent Safety Review System. These appraisals and assessments (audits) shall, as a minimum, incorporate the following functions:

a. Advise the Operations Manager of results as they relate to nuclear and hazardous material safety.

b. Recommend to the Operations Manager any corrective action to improve nuclear or hazardous material safety and facility operation.

c. Describe audit findings in sufficient detail to ensure that corrective action can be effectively carried out.

d. Notify the Safety Review Board of any disagreements between the audit organization and the Operations Manager as to the adequacy and timeliness of corrective actions which occur as a result of the audit.

4.4.4.2.2 Responsibilities

Building 906 performance based audits shall be used to conduct, as a minimum, the following:

a. Audit the conformance of unit operation to provisions of the TSRs at least once per calendar year (interval between audits not to exceed 15 months).

b. Audit the training and qualifications of the facility staff.

c. Audit the performance of activities required to meet Rocky Flats Plant quality assurance requirements.

d. Audit facility procedures.

e. Audit the performance of facility programs.

f. Audit actions taken to correct deficiencies occurring in equipment, structures, or methods of operation that affect nuclear and hazardous material safety.

g. Audit activities and documents as requested by the Associate General Manager of Standards, Audits, and Assurance or the Operations Manager.

(6)

4.4.4.3 Self-Evaluation Program

The Operations Manager shall conduct an assessment of functions and activities in accordance with the Rocky Flats Plant Self-Evaluation Program.

4.4.4.3.1 The Building 906 Operations Manager shall ensure:

a. The submittal of Plans, Checklists, and Schedules to upper-level management for review and approval.

b. The performance of self-evaluations by management and supervisory personnel of functions, activities, and programs in their areas of responsibility.

c. Management By Walking Around self-evaluations performed by management and supervisory personnel of functions, activities, and programs in their areas of responsibility.

d. Documentation of concerns, adverse findings, and needed improvements.

e. Initiation of analyses and actions to correct adverse findings and implement needed improvements.

4.4.4.4 Records

Written records of facility reviews, audits, and assessments shall be maintained. As a minimum, these records shall include:

a. Results of performance-based audits conducted under the provisions of these Technical Safety Requirements.

b. Recommendations made to the Operations Manager as a result of the review.

c. Recommended approval or disapproval of items under review.

d. Determination as to whether the items under review constitute an unreviewed safety question.

e. Assessments as to the safety significance of the review or audit findings.

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several documents including the COEM, the COOP, and the IWCP.

The COEM ensures that engineering design changes are implemented in a consistent manner and that each receives appropriate safety and USQD reviews. The COEM also provides a mechanism for both Engineering Operability Evaluations (EOEs) and Technical Safety Requirement (TSR) interpretations. EOEs allow for an engineering determination of equipment or system operability in cases where the operability may be in question. The OSR interpretation process allows for engineering evaluation and interpretation of OSRs which may not be clear in a particular situation. Both of these processes are controlled by procedures within the COEM and assure the continued health and safety of the public while allowing needed operational flexibility.

The COOP ensures that daily operations are carried out in a safe and controlled manner and is the field level document used to ensure that the bounds of the SAR are maintained during daily operations. The IWCP ensures that all facility modifications are performed within the bounds of the safety envelope and that all proposed modifications receive a USQD review as appropriate.

5.11.2 Independent Safety Review

An Independent Safety Review system has been established (EG&G, 1994b) to provide independent review of a variety of subjects including nuclear safety, the environment, health and safety of the workers and the public, and management of facilities. The Safety Review Board (SRB) comprises part of this system (EG&G, 1994a). The SRB consists of senior managers. The SRB provides the upper tier review of issues and makes recommendations to the General Manager. The Operations Review Committees (ORCs) (EG&G, 1993p) are also part of the Independent Safety Review System. The ORCs review proposed physical and administrative changes to nuclear facilities. The primary purpose is to identify nuclear safety issues that could impact the safety envelope, safety equipment, worker safety, or the environment.

5.11.3 Occurrence Reporting

Reportable Occurrences are categorized in accordance with EG&G, 1993m, *Occurrence Categorization.* Guidance on the actual reporting of the occurrences, as well as guidance to determine when an occurrence is reportable, is contained in *Occurrence Reporting Process* (EG&G, 1993r).

5.11.4 Self Evaluation

The requirements for performing self evaluations are contained in *Self Evaluation Program* (EG&G, 1993s). The objectives of performing self evaluations are to:

- Ensure compliance with requirements and commitments
- Identify deficient conditions and work practices
- Identify needed improvements
- Correct identified deficiencies

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CHAPTER 4

TECHNICAL SAFETY REQUIREMENTS

4.1 INTRODUCTION

This chapter describes the derivation of the Technical Safety Requirements (TSR) for Building 906. The TSRs are included as Sections 4.3 and 4.4 of this chapter.

4.2 DERIVATION OF TECHNICAL SAFETY REQUIREMENTS

Because Building 906 is a Hazard Category 3 facility used only for waste storage, inventory control TSRs are required for Building 906 to limit building inventory of radionuclides. These inventories must remain at or below the levels analyzed in the accident analysis. Administrative control TSRs are also required to assure that the safety management controls, which act to ensure continued safe operation of the facility, are in place when the facility is operational. More detailed descriptions of the programs and the procedures that implement them at RFETS are provided in Chapter 5. The inventory and administrative control TSRs are required to keep Building 906 within the safety envelope analyzed in the accident analysis. This approach is suggested by DOE (DOE, 1992; Stello, 1993; and Grethel, 1993) for Hazard Category 3 facilities.

The waste stored in Building 906 will be categorized by Item Description Codes (IDCs) and written descriptions, which can be used to determine the radionuclide content used in the accident analysis (Chapter 3). The waste will be low-level and low-level mixed waste in drums or crates. These forms and drum or crate quantities, were used to determine both the Hazard Category of the facility and the consequences of various accidents. The possible storage configuration determine the upper inventory limit that must not be exceeded and is controlled by a TSR. The resultant TSR is provided as Section 4.3 of this chapter.

B 4.3 TECHNICAL SAFETY REQUIREMENTS, INVENTORY LIMIT

B 4.3.1 Centralized Waste Storage Facility (CWSF) Storage Limits

BASES

BACKGROUND

Building 906 is the Centralized Waste Storage Facility (CWSF) at the Rocky Flats Environmental Technology Site (RFETS). The CWSF is used to store hazardous waste materials, in particular low-level waste (LLW), low-level mixed waste (LLMW), and hazardous chemical waste (HAZ). These wastes are a combination of materials that have been generated by past operations at RFETS and waste materials that will be generated in the future as part of normal operations and the Decontamination and Decommissioning (D&D) activities at RFETS. Based on the inventory thresholds identified in DOE-STD-1027-92 and the amount of hazardous material stored within this facility, Building 906 is considered a Hazard Category 3 facility for radionuclides as well as for hazardous chemicals.

APPLICABLE SAFETY ANALYSES

As described in Chapter 3, the Waste and Environmental Management System (WEMS) computer tracking system was queried to establish the amounts of radioactive and chemical material in waste forms destined for the CWSF. The identification of hazardous materials stored in these containers is based on process knowledge and a knowledge of where the waste originated. Upper limits on these amounts were estimated from a statistical analysis of available data, such as assays. Estimates were also made as to the amount and type of future waste generation destined for the CWSF. The future waste estimates were considered in arriving at the limits in LCO 4.3.1.

DOE-STD-1027-92 establishes different Hazard Categories based on the total building inventory of radionuclides. For the types of waste to be stored at the CWSF, ^{239}Pu is the limiting isotope. The threshold values for ^{239}Pu for Hazard Category 3 and Hazard Category 2 are 8.4 and 900 grams, respectively. The primary goal of LCO 4.3.1 is to protect the Hazard Category 3 classification by not allowing radionuclide inventory to exceed the limits established in DOE-STD-1027-92. If the waste quantities in LCO 4.3.1 are not exceeded, the total quantity of radionuclides will not exceed either the 900 gram upper limit ^{239}Pu or the limits established for any of the other isotopes in DOE-STD-1027-92.

4.4.3 Training

4.4.3.1 A training and replacement training program for facility staff shall be maintained under the direction of the Building 906 Operations Manager.

4.4.3.2 Individuals who operate, maintain, provide support, or supervise activities in Building 906 shall receive training in the nuclear safety and hazardous materials aspects of their jobs including specific activities related to the CWSF. Each member of the facility management, operating staff, and supporting personnel shall demonstrate that they meet the minimum skills and knowledge qualifications for their job responsibilities.

4.4.3.3 Training shall address procedures, Technical Safety Requirements (TSRs), Configuration Change Control, Conduct of Operations, radiation protection, respiratory protection, industrial safety, and hazardous materials. In addition, training shall also address the location and function of safety equipment. Operations personnel and supervision shall also receive annual emergency preparedness training in accordance with DOE Order 5480.5.

4.4.4 Independent Safety Reviews, Audits, and Self-Evaluation Program

4.4.4.1 Safety Reviews

The Operations Review Committee (ORC) applicable to Building 906 is the RMRS ORC.

4.4.4.1.1 Functions

The RMRS ORC shall conduct independent safety reviews which as a minimum, incorporate the following functions:

a. Perform independent safety reviews of facility programs and activities and advise the Operations Manager on all matters related to nuclear and hazardous material safety.

b. Recommend to the Operations Manager approval or disapproval of programs and activities, and which of these may present an Unreviewed Safety Question (USQ), prior to their implementation.

c. Review proposed tests or experiments and proposed modifications to systems or equipment that may affect nuclear or hazardous material safety, prior to implementation.

4.4.4.1.2 Responsibilities

The RMRS ORC shall conduct, as a minimum, independent safety reviews for the following programs and activities:

a) Maintenance or modifications involving safety significant activities such as chemical or toxicological hazards which may affect the safety of personnel, the public, or the environment.

b) Proposed tests, experiments, and normal or abnormal operations, that could pose potentially significant radioactive or nonradioactive hazards to workers, the public, or the environment.

c) Procedures.

d) TSRs and changes thereto.

e) An unplanned, uncontrolled, unmonitored, or unfiltered release of radioactive or hazardous material with the potential to significantly affect personnel, the public, or the environment.

f) Other safety significant activities as identified by the Operations Manager or the Operations Review Committee which could potentially affect the safety of personnel, the public, or the environment.

g) Reportable occurrences.

h) Safety evaluations

4.4.4.2 Audits

4.4.4.2.1 Functions

The Operations Manager shall submit the items required for the performance of facility appraisals and assessments in support of the Independent Safety Review System. These appraisals and assessments (audits) shall, as a minimum, incorporate the following functions:

a. Advise the Operations Manager of results as they relate to nuclear and hazardous material safety.

b. Recommend to the Operations Manager any corrective action to improve nuclear or hazardous material safety and facility operation.

c. Describe audit findings in sufficient detail to ensure that corrective action can be effectively carried out.

4.4.4.2.2 Responsibilities

Building 906 performance based audits shall be used to conduct, as a minimum, the following:

a. Audit the conformance of unit operation to provisions of the TSRs at least once per calendar year (interval between audits not to exceed 15 months).

b. Audit the training and qualifications of the facility staff.

c. Audit the performance of activities required to meet RFETS quality assurance requirements.

d. Audit facility procedures.

e. Audit the performance of facility programs.

f. Audit actions taken to correct deficiencies occurring in equipment, structures, or methods of operation that affect nuclear and hazardous material safety.

g. Audit activities and documents as requested by the Associate General Manager of Standards, Audits, and Assurance or the Operations Manager.

4.4.4.3 Self-Evaluation Program

The Operations Manager shall conduct an assessment of functions and activities in accordance with the RFETS Self-Evaluation Program.

4.4.4.3.1 The Building 906 Operations Manager shall ensure:

a. The submittal of Plans, Checklists, and Schedules to upper-level management for review and approval.

b. The performance of self-evaluations by management and supervisory personnel of functions, activities, and programs in their areas of responsibility.

c. Management By Walking Around self-evaluations performed by management and supervisory personnel of functions, activities, and programs in their areas of responsibility.

d. Documentation of concerns, adverse findings, and needed improvements.

e. Initiation of analyses and actions to correct adverse findings and implement needed improvements.

4.4.4.4 Records

Written records of facility reviews, audits, and assessments shall be maintained. As a minimum, these records shall include:

a. Results of performance-based audits conducted under the provisions of these Technical Safety Requirements.

b. Recommendations made to the Operations Manager as a result of the review.

c. Recommended approval or disapproval of items under review.

d. Determination as to whether the items under review constitute an unreviewed safety question.

e. Assessments as to the safety significance of the review or audit findings.

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several documents including the COEM, the COOP, and the IWCP.

The COEM ensures that engineering design changes are implemented in a consistent manner and that each receives appropriate safety and USQD reviews. The COEM also provides a mechanism for both Engineering Operability Evaluations (EOEs) and Technical Safety Requirement (TSR) interpretations. EOEs allow for an engineering determination of equipment or system operability in cases where the operability may be in question. The OSR interpretation process allows for engineering evaluation and interpretation of OSRs which may not be clear in a particular situation. Both of these processes are controlled by procedures within the COEM and assure the continued health and safety of the public while allowing needed operational flexibility.

The COOP ensures that daily operations are carried out in a safe and controlled manner and is the field level document used to ensure that the bounds of the SAR are maintained during daily operations. The IWCP ensures that all facility modifications are performed within the bounds of the safety envelope and that all proposed modifications receive a USQD review as appropriate.

5.11.2 Independent Safety Review

An Independent Safety Review system has been established (EG&G, 1994b) to provide independent review of a variety of subjects including nuclear safety, the environment, health and safety of the workers and the public, and management of facilities. The Operations Review Committees (ORCs) (EG&G, 1993p) are also part of the Independent Safety Review System. The ORCs review proposed physical and administrative changes to nuclear facilities. The primary purpose is to identify nuclear safety issues that could impact the safety envelope, safety equipment, worker safety, or the environment.

5.11.3 Occurrence Reporting

Reportable Occurrences are categorized in accordance with EG&G, 1993m, *Occurrence Categorization*. Guidance on the actual reporting of the occurrences, as well as guidance to determine when an occurrence is reportable, is contained in *Occurrence Reporting Process* (EG&G, 1993r).

5.11.4 Self Evaluation

The requirements for performing self evaluations are contained in *Self Evaluation Program* (EG&G, 1993s). The objectives of performing self evaluations are to:

- Ensure compliance with requirements and commitments
- Identify deficient conditions and work practices
- Identify needed improvements
- Correct identified deficiencies

APPENDIX 2

USQD-906-97.1199-RAB,
TSR CHANGES TO BUILDING 906 FSAR

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

USQD COVER SHEET

USQD No.: USQD-906-97.1199-RAB	Building 906	Page 1 of 6
Title: TSR Changes to Building 906 FSAR		Job # NH774000

Preparer	N/A (Print Name)	(Sign Name)	Date
Criticality Safety Reviewer	N/A (Print Name)	(Sign Name)	Date
Certified Evaluator	R. A. Beaulieu, Safety Analyst, MACTEC (Print Name)	Ronald Beaulieu (Sign Name)	Date 8-25-97
Peer Reviewer	J.N. Conyers (Print Name) Safety Analyst, G2	J N Conyers (Sign Name)	Date 8/25/97
Manager, Kaiser-Hill NE; Manager SSOC ONS; or Team Lead, RMRS AB	D. R. Swanson (Print Name)	D R Swanson (Sign Name)	Date 8/26/97
ORC RMRS 97-042	Asa Reed (Print Name)	J. Reed (Sign Name)	Date 8/27/97
Responsible Manager	S.W. Dewitt (Print Name)	S W Dewitt (Sign Name)	Date 8/26/97
Operations Manager	P.M. Sauer (Print Name)	T E Buselow for P M Sauer (Sign Name)	Date 8-26-97

Note 1 CSR	Note 2 CEV	Note 3 Peer Reviewer	Note 4 Manager, Kaiser-Hill, NE; Manager, SSOC ONS; or Team Lead, RMRS AB	Note 5 ORC

Note 6 Responsible Manager	Note 7 Operations Manager	Note 8 Revision No.	Note 9 New Evaluation Required ☑	
			Yes	No

Note 1: The Criticality Safety Reviewer initials for revision of USQD.
Note 2: The Certified Evaluator initials for revision of USQD.
Note 3: Peer Reviewer initials for revision of USQD.
Note 4: Manager, Kaiser-Hill NE; Manager SSCO ONS; or Team Leader RMRS AB initials for revision.
Note 5: ORC initials for revision.
Note 6: Responsible Manager initials for revision.
Note 7: Operation Manager initials for revision.
Note 8: Revision of the USQD.
Note 9: Check (✓) if revision significant to require reevaluation. Initials above needed to confirm only *No* determinations and a justification is required.
Note 10: Changes to this USQD shall be made by a Certified Evaluator.
Note 11: Mark not applicable signature blanks "N/A".

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REVIEWED FOR CLASSIFICATION/UCNI
By J. N. CONYERS
Date 8/25/97

REVISION DOCUMENTATION SHEET		
Revision Number	Date	Describe Changes Required for Revision or Justification for 'No Evaluation' Required
0	8-25-97	Initial Issue

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Title: TSR Changes to Building 906 FSAR

Description and Purpose of Proposed Activity: The proposed activity is the changes to the Technical Safety Requirements (TSR) in Chapter 4 of the Building 906 Final Safety Analysis Report (FSAR). The changes are discussed below. The proposed changes to the TSR require DOE approval prior to incorporation into the FSAR.

Proposed TSR Change 1
Delete references to the Safety Review Board and replace references to the Building ORC with the RMRS ORC.

Page 4-8, Section 4.4.4.1. Change sentence to read: The Operations Review Committee (ORC) applicable to Building 906 is the RMRS ORC.

Page 4-8, Section 4.4.4.1.1. Change first sentence reference of "Building ORC" to "RMRS ORC."

Page 4-9, Section 4.4.4.1.1. Delete subsection "d."

Page 4-9, Section 4.4.4.1.2. Change first sentence reference of "Building ORC" to "RMRS ORC."

Page 4-9, Section 4.4.4.1.2.f: Change to read: Other safety significant activities as identified by the Operations Manager or the Operations Review Committee which could potentially affect the safety of personnel, the public, or the environment.

Page 4-10, Section 4.4.4.2.1. Delete subsection "d."

Page 5-9, Section 5.11.2. Delete second and third sentences.

Justification:
The Safety Review Board is no longer in existence. The Building ORC is now referred to as the RMRS ORC. Reference: Letter from A.P. Power to D.W. Croucher, ORC Self-Assessment, APP-002-97, 1/30/97.

Proposed TSR Change 2
Editorial clarification. Clarify the first paragraph and delete third paragraph.

Page 4-1, Section 4.2. Change the first paragraph to read:

Because Building 906 is a Hazard Category 3 facility used only for waste storage, inventory control TSRs are required for Building 906 to limit building inventory of radionuclides. These inventories must remain at or below the levels analyzed in the accident analysis. Administrative control TSRs are also required to assure that the safety management controls, which act to ensure continued safe operation of the facility, are in place when the facility is operational. More detailed descriptions of the programs and the procedures that implement them at RFETS are provided in Chapter 5. The inventory and administrative control TSRs are required to keep Building 906 within the safety envelope analyzed in the accident analysis. This approach is suggested by DOE (DOE, 1992; Stello, 1993; and Grethel, 1993) for Hazard Category 3 facilities.

Justification:
The language was not clear in the first paragraph and the third paragraph was redundant.

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Proposed TSR Change 3
Editorial change. Replace "Rocky Flats Plant" or "RFP" with "Rocky Flats Environmental Technology Site" or "RFETS" as appropriate.

Pages 4-1, 4-4, 4-10, and 4-11.

Justification:
Reflect name change of Site.

Reference Documents:

Letter from A.P. Power to D.W. Croucher, Operations Review Committee Self-Assessment, APP-002-97, 1/30/97.

Applicable Requirements:

- "Unreviewed Safety Questions," DOE Order 5480.21
- "Technical Safety Requirements," DOE Order 5480.22
- "Nuclear Safety Analysis Reports," DOE Order 5480.23
- The following chapters of the Building 906 FSAR are affected

  Chapter 4, Technical Safety Requirements
  Chapter 5, Safety Management Programs

Safety, Operating Function, and Operating Conditions Identification: The safety, operating function, and operating conditions do not change from revision 3 of the Building 906 TSR to the proposed changes identified in the Building 906 TSR. The proposed TSR changes are administrative and editorial.

Failure Mode, Hazard, and Accident Identification: The qualitative evaluation method is used in this USQD. No change in MAR is involved with the proposed activity. No unanalyzed direct or indirect effects to Building 906 will occur as a result of the proposed activity.

USQD Questions

1. **Could the proposed activity increase the probability of occurrence of an accident previously evaluated in a Safety Analysis? Yes** _____ **No** ✔ _____ **Explain:** The proposed TSR changes did not change the probability of occurrence of the accidents discussed in the FSAR. The accident analyses are unaffected by the proposed changes to the TSR.

2. **Could the proposed activity increase the consequences of an accident previously evaluated in a Safety Analysis? Yes** ___ **No** ✔ _____ **Explain:** The proposed TSR changes did not change the consequence of the accidents discussed in the FSAR. The accident analyses are unaffected by the proposed changes to the TSR.

3. **Could the proposed activity increase the probability of occurrence of a malfunction of equipment important to safety previously evaluated in a Safety Analyses? Yes** _____ **No** ✔ **Explain:** No unanalyzed direct or indirect effects to Building 906 are expected to occur as a result of the proposed activity.

4. **Could the proposed activity increase the consequence of a malfunction of equipment important to safety previously evaluated in a Safety Analyses? Yes** _____ **No** ___✔___ **Explain:** No unanalyzed direct or indirect effects to Building 906 are expected to occur as a result of the proposed activity.

5. **Could the proposed activity create the possibility of an accident of a different type than any previously evaluated in a Safety Analyses? Yes** _____ **No** ___✔___ **Explain:** The accident types did not change in the proposed TSR changes. The possibility of an accident of a different type did not occur for the proposed activity.

6. **Could the proposed activity create the possibility of a malfunction of equipment important to safety of a different type than any previously evaluated in a Safety Analyses? Yes** _____ **No** ___✔___ **Explain:** No unanalyzed direct or indirect effects to Building 906 are expected to occur as a result of the proposed activity.

7. **Could the proposed activity reduce the margin of safety as defined in the basis for any TSR? Yes** _____ **No** ___✔___ **Explain:** The proposed activity has no adverse impact or effect on the margin of safety, either explicitly or implicitly. The proposed TSR changes are administrative and editorial.

NOTE 1: ***If any of the above seven USQD questions are checked (✓) Yes, the activity is a USQ. The Manager, Kaiser-Hill NS or Manager, EI&RM is immediately notified before proceeding.***

8. **Does the activity constitute a USQ? Yes** _____ **No** ___✔___ **Explain:** Questions one through seven, 14 and 15 are all answered "No." Therefore, the TSR Changes for Building 906 FSAR, Rev. 4, do not constitute an Unreviewed Safety Question.

9. **Does the activity require a change to the TSR (or OSR)? Yes** _____ **No** ___✔___ Even though the activity is a TSR change, this TSR change does not cause further TSR changes. The proposed activity—a TSR change—does not cause a condition where a TSR violation would result. No changes to surveillance or operability criteria explicitly described in the TSR will occur.

10. **Could the activity result in exceeding the criticality safety acceptance criteria? Yes** _____ **No** ___✔___ **Explain:** The controls identified by Criticality Safety are not changed by the changes to the Building 906 TSR. Since no fissile material is involved, review by Criticality Safety Engineering is unnecessary.

NOTE 2: ***If any of the above questions are checked (✓) Yes, DOE approval is required to proceed with the proposed activity.***

11. **Does the proposed activity require an authorization-basis related document change? Yes** _____ **No** ___✔___ **Explain:** The proposed activity is an authorization-basis document change and will be submitted to the DOE. The proposed TSR changes are administrative and editorial. This proposed change will not require changes to other authorization-basis related documents.

12. Hazardous Material Evaluation:

12.1 Does the proposed activity introduce a new hazardous material not evaluated in a Safety Analysis? Yes _____ No ___✔___ Explain: The proposed activity does not introduce hazardous materials to areas of Building 906.

12.2 Does the proposed activity increase the probability or consequences of an accident resulting from hazardous materials previously evaluated in Safety Analyses, or exceed any established inventory quantity limits? Yes _____ No ___✔___ Explain: The inventory will not be effected by the proposed activity.
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NOTE 3: *If Hazardous Material Evaluation has a question checked (✓) Yes, DOE notification is required to proceed with the proposed activity.*

13. Are Compensatory Actions required? Yes _____ No ___✔___

NOTE 4: *If questions 14 or 15 are checked (✓) Yes, DOE approval is required to proceed with the proposed activity.*

14. Could the proposed activity result in a significant increase in composite risk? Yes _____ No ___✔___ Explain: The proposed TSR changes do not introduce unanalyzed failure modes in Building 906 and do not constitute an increase in composite risk.

15. Could the proposed activity result in a significant increase in worker risk? Yes _____ No ___✔___ Explain: The proposed TSR changes do not introduce unanalyzed failure modes in Building 906 and do not constitute an increase in worker risk.

16. USQD Conclusion The proposed TSR changes are administrative and editorial. The responses to USQD questions 1 through 15 are all "No." Therefore, the TSR Changes for Building 906 FSAR, Rev. 4, do not constitute an Unreviewed Safety Question.

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